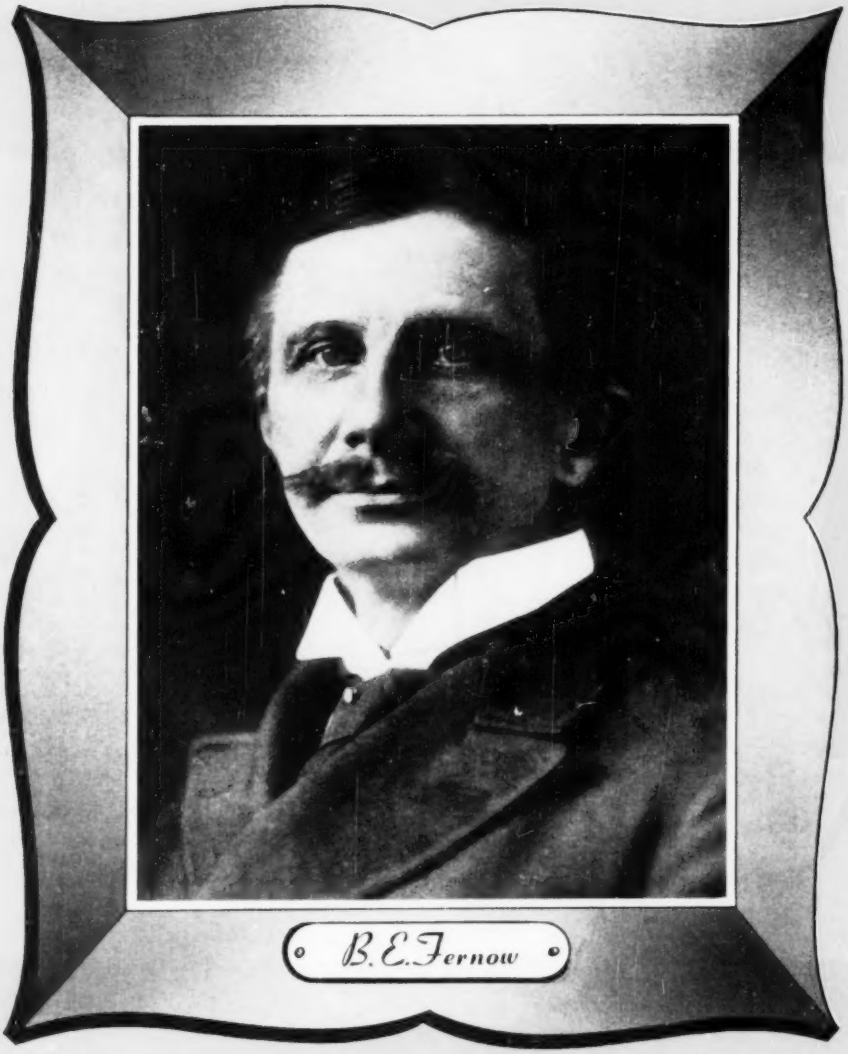
Journal of FORESTRY

DECEMBER 1952



B. E. Fernow

SOCIETY OF AMERICAN FORESTERS 1900

Volume 50
Number 12
(Including Index)

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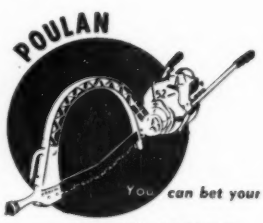

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Journal of Forestry

Official Organ of the Society of American Foresters

The Journal of Forestry: An Historical Summary of the First Fifty Years

Henry Clepper

Managing editor, JOURNAL OF FORESTRY; executive secretary, Society of American Foresters.

Two years ago when the Society of American Foresters celebrated its golden anniversary, the occasion was marked by an historical summary of the Society's first fifty years published in the November 1950 issue of the JOURNAL OF FORESTRY. *Written by Ralph S. Hosmer, the history recorded not only the development of the Society; it gave appropriate credit to those members whose unselfish contributions through service on the Council, on committees, and on other assignments helped create the profession of forestry.*

Perhaps the most significant characteristic of the forward-looking attitude of our early foresters was their aggressive faith in the future of their profession. They did not hesitate to form a professional society at a time (1900) when there were less than a dozen professionally trained foresters in the nation. What is even perhaps more remarkable, they established a professional periodical two years later with, according to Dr. Bernhard E. Fernow, "barely over 100 readers."

From this parent periodical, Forestry Quarterly, *was born the* JOURNAL OF FORESTRY. *And now the fiftieth anniversary of the* JOURNAL *marks another significant milestone in the steady, uphill progress of forestry in America.*

This record of the JOURNAL *is not a documented history. Rather, like Prof. Hosmer's account of the Society, it is an historical summary. Its purpose is not to pinpoint minutiae, but rather to emphasize highlights.*

Every leading article published in the JOURNAL *is listed in the permanent index by title and name of author. Not so recorded, however, are those who, oftenly obscurely but usually devotedly, served on the editorial staff. Hence the following historical summary makes mention of those members who contributed their time and talents as editors. For those editors Prof. Hosmer has written a special tribute, as gracious and sincere as it is deserved.*

APOLOGIA

Among writers of an earlier generation it was often the custom to preface their efforts with an *apologia*, meaning, in its original sense, a justification of the work attempted. I revive the term because my approach to the interesting subjects assayed is partly personal as well as historical; hence an author's explanation may be in order.

For more than thirty years I have been convinced that the JOURNAL represents one of the most significant aspects of forestry in America. Two of my earliest professional ambitions were to contribute an article to the JOURNAL and, eventually, to attain sufficient merit to help edit it. The first of these ambitions was realized when my first article was accepted for publication in 1929; the second, when I was appointed an associate editor in 1934. It seems a special mark of Fortune's favor that I have been editorially associated with the JOURNAL continuously for eighteen years. To me the JOURNAL in all its ramifications, its articles in all their varieties, and its many contributors and editors in all the manifestations of their diverse personalities, has been endlessly interesting.

Since, however, probably few readers share my enthusiasm and interest in the minutiae of JOURNAL history, I have omitted from this account all except the highlights. Absorbing chapters might be written on the subject of the personal viewpoints expressed in editorials over the years, on once heated but now long forgotten controversies both technical and philosophical, on articles which made a certain stir in forestry circles but which could never have been published without anonymous rewriting by one or more editors. Perhaps I shall write about these matters some day, but this is not the appropriate time.

Now that forestry is securely established as a recognized profession, and the practice of forestry is recognized as a contribution to our American way of life, we tend to forget the early spadework of those who planted the tree whose fruits we gather. We tend to forget those who, forty and fifty years ago, gave generously of their time and talents, without pay and without expectation of gratitude, making thereby an investment in our professional literature whose profits we now enjoy.

For the JOURNAL is a professional dividend of incalculable value; and, I like to think, to the extent that forestry now and in the future benefits from it—to that extent those who made the original investment, whether living or dead, feel amply rewarded.

Forestry Quarterly

It may come as a surprise to many foresters to learn that the *Forestry Quarterly*, the first professional forestry periodical in America and the forerunner of the JOURNAL OF FORESTRY, was started

ASA S. WILLIAMS

in October 1902 as a student publication. In its inception and management it was a product of the New York State College of Forestry at Cornell University. Its first managers were Asa S. Williams, editor; Frederick Dunlap, assistant editor; Albert F. Siebold, business manager; and Clyde Leavitt, assistant. Its supervision, "by an Advisory Board of older men," was under the direction of Bernhard E. Fernow, John Gifford, and Walter Mulford.

Years later Dr. Fernow, writing in *The Cornell Forester* for 1920, spoke of an undertaking which would be remembered of the Cornell College of Forestry—"the publication of a professional journal, the *Forestry Quarterly*, a publication that long outlived the College. . . ."

Then, as to the origin of the magazine—a matter which on occasion has been in dispute—Dr. Fernow definitely put the record straight. "The *Quarterly*," he wrote, "was originated by the Cornell students in the last year of the existence of the College, and to Asa Williams, '03, its first editor, belongs the glory of carrying it through its first year, after which it became the private enterprise of the writer."

In announcing the first issue, the editors said:

> Although there are a number of publications in the United States and Canada, wholly or in part devoted to the propagandism of forestry, there are at the present time none which are mainly or entirely devoted to the professional or technical interests of the subject.
>
> With the establishment, within the last four years, of two fully equipped special schools of forestry, whose graduates have begun work in the field; with the rapid expansion of the field work of the Federal Forestry Bureau, and of other agencies in technical direction, professional foresters have multiplied, and the need for means of communication among those who are building up the science and art of forestry in the United States seems to have arrived.
>
> *The Forestry Quarterly* is intended to meet this need.

In addition, the first number contained this interesting statement, as timely in 1952 as it was in 1902.

> The objects for which this journal is published are:
>
> To aid in the establishment of rational forest management.
>
> To offer an organ for the publication of technical papers of interest to professional foresters in America.
>
> To keep the profession in touch with the current technical literature and the forestry movement in the United States.

B. E. Fernow, Editor-in-Chief

But only the first volume was published under the auspices of the New York College of Forestry. With the closing of the college in 1903, the *Quarterly* entered upon an independent career and was published privately under an editorial board that represented the profession at large. Dr. Fernow became editor-in-chief, and served continuously in that capacity throughout its existence.

To the editorial board when Dr. Fernow became editor-in-chief were appointed Henry S. Graves, Filibert Roth, John C. Gifford, Richard T. Fisher, Walter Mulford, Ernest A. Sterling, Asa S. Williams, Stuart J. Flintham, Clyde Leavitt, and Frederick Dunlap. All these men with the exception of Mr. Flintham, Dr. Mulford, and Dr. Gifford served continuously on the editorial board throughout the *Quarterly's* existence. Dr. Mulford and Mr. Williams were not on the board during the period 1905-1908, but were reappointed in 1909 and served until the end.

BERNHARD E. FERNOW

Hugh P. Baker and Raphael Zon were on the editorial staff from 1905 on. C. D. Howe served from 1909, R. C. Bryant from 1911, Samuel J. Record and J. H. White from 1912, and T. S. Woolsey and A. B. Recknagel from 1913. Frank J. Phillips and John Foley also served briefly.

In all, 21 men served the *Forest Quarterly* editorially during its existence, 7 of them for 13 years. Great professional credit is due them, for in a very real sense they laid the foundation of our periodical technical forestry literature.

Proceedings of the S.A.F.

The Proceedings of the Society of American Foresters began publication in May 1905. The first issue of 28 pages contained a paper by President Theodore Roosevelt entitled "Forestry and Foresters" which he had previously delivered before a Society meeting.

The Committee on Publications consisted of Alfred Gaskill, chairman, Raphael Zon, and George L. Clothier. With the 1906 issue R. S. Kellogg had replaced Mr. Clothier. In 1907 the Committee was composed of Raphael Zon, chairman, Samuel N. Spring, and Louis Margolin.

By 1908 the *Proceedings* had an Editorial Board. Henry S. Graves of the Yale University School of Forestry was editor-in-chief; the other members were Austin Cary, Bernhard E. Fernow, Gifford Pinchot, Overton W. Price, Filibert Roth, Carl A. Schenck, Herbert A. Smith, and Raphael Zon. It will be observed that several of the men active in the editing of the *Proceedings* were also serving on the

editorial staff of the *Forestry Quarterly*. With the first issue of 1909, Mr. Price had retired from the board and George B. Sudworth had been added.

In 1910 Dr. Zon of the U. S. Forest Service replaced Dean Graves as editor-in-chief, though the latter continued on the editorial staff. The remainder of the board consisted of Smith Riley, B. E. Fernow, Harry D. Tiemann, Cary L. Hill, Harry M. Hale, Philip W. Ayres, Charles A. Scott, and Royal S. Kellogg.

A new Editorial Board was appointed for 1911. Dr. Zon continued as editor-in-chief, with Dean Graves, Smith Riley, Dr. Fernow, Mr. Tiemann, Samuel N. Spring, Mr. Ayres, Ralph C. Bryant, Mr. Kellogg, and Prof. Roth.

The Editorial Board for 1912 was composed of Dr. Zon, W. T. Cox, Dr. Fernow, William B. Greeley, Austin F. Hawes, F. G. Miller, Mr. Price, F. A. Silcox, and James W. Toumey.

For 1913: Dr. Zon, Carlos G. Bates, J. T. Jardine, R. S. Kellogg, Barrington Moore, Thornton T. Munger, A. B. Recknagel, Prof. Toumey, and H. F. Weiss.

For 1914: Dr. Zon, Irving W. Bailey, Findley Burns, Barrington Moore, G. A. Pearson, O. L. Sponsler, S. N. Spring, Prof. Toumey, and H. F. Weiss. This board functioned through the April 1916 issue when the final board, prior to consolidation of the *Proceedings* with the *Quarterly*, was made up of Dr. Zon as editor-in-chief, Mr. Bates, David T. Mason, and Messrs. Moore, Pearson, Sponsler, Toumey, Weiss, and Woolsey.

As was the case with the *Quarterly*, one man served as editor of the *Proceedings* practically during its entire existence. He is Dr. Zon who was on the Committee on Publications during 1905 and 1906, and who became editor-in-chief in 1907, which office he held continuously thereafter, except for two years when Dean Graves was editor-in-chief. In all, forty men served at various times on the editorial board during the eleven years the magazine was published.

A Merger Announced

In the December 1916 issue of the *Forestry Quarterly* appeared the following announcement:

> With this issue, the *Forestry Quarterly* completes its fourteenth volume, and with it concludes its existence.
>
> With the year 1917, it will begin a new life in amalgamation with the *Proceedings* of the Society of American Foresters, under the title JOURNAL OF FORESTRY.

The *Proceedings*, which also appeared four times a year, contained a note in its final (October 1916) issue as follows:

> Regardless of the amalgamation of the *Proceedings* with the *Forestry Quarterly*, it seems desirable to the Committee (the Executive Committee of the Society of American Foresters—*Ed.*) to change the name of the *Proceedings*. This has long been a misnomer, since but a small part of the publication deals with the actual doings or transactions of the Society, the major portion consisting of technical articles submitted to it for publication which have never been presented to the Society. In keeping with this character of the publication, it is believed by your committee that the JOURNAL OF FORESTRY will be a more suitable title.

Debut of the JOURNAL

Accordingly, in January 1917 the JOURNAL OF FORESTRY made its debut with this announcement: "Although the two magazines have been filling a distinct place in the field of professional forestry in North America, one laying particular emphasis on original articles and substantial reviews, the other attempting to cover to a large extent the entire field of forest literature in this country and abroad, the amalgamation of the two into one magazine, it is hoped, will serve the needs of the profession in a more efficient way than did the two parent publications."

ALFRED GASKILL

HENRY S. GRAVES

Another announcement in the first issue of the JOURNAL said it would be published henceforth under the direction of a Board of Editors appointed by the president of the Society. An interesting condition of the transfer of interests in the *Forestry Quarterly* was that Dr. Fernow should be appointed by succeeding presidents as editor-in-chief "as long as he is willing to discharge these duties and as long as such action is consistent with the interests of the Society." Furthermore, it was understood that the editor of the *Proceedings* would act as the managing editor of the JOURNAL, subject also to appointment by succeeding presidents.

The JOURNAL appeared eight times a year, monthly with the exception of June, July, August, and September. Incidentally, this policy of publishing eight issues annually continued until 1935 when it went on a monthly basis. In order to retain the continuity of the professional organ begun with the *Forestry Quarterly*, the new volume of the JOURNAL was designated Volume XV.

Dr. Fernow's Staff

The JOURNAL was, therefore, launched with Dr. Fernow, now at

the University of Toronto, as editor-in-chief and Dr. Zon as managing editor. It was departmentalized with the following associate editors, all recognized specialists in their fields: Ralph C. Bryant, forest utilization; Burt P. Kirkland, forest finance; Barrington Moore, forest ecology; A. B. Recknagel, forest mensuration; J. W. Toumey, silviculture; Harry D. Tiemann, forest technology; and T. W. Woolsey, Jr., policy and administration.

This editorial staff functioned without change until March 1922. That issue showed that Mr. Tiemann and Prof. Bryant were no longer on the board. In their place was Emanuel Fritz whose assignment was broadened to include both forest utilization and technology. G. B. MacDonald had been added to handle forestry education and farm forestry.

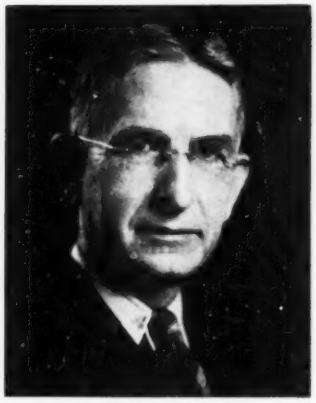
In passing, the present writer cannot forego the opportunity to say that in his considered opinion the late Dr. Fernow, more than any man in the formative years of American forestry, deserves credit for establishing our periodical technical literature on its continuing sound and useful basis. For twenty years he had given editorial leadership to the profession and it is no exaggeration to call him the father of American forestry literature.

Forty-three pages of the April 1923 issue of the JOURNAL are devoted to appreciations of Dr. Fernow, and to a bibliography of his writings—incidentally, one of the most impressive bibliographies in the history of American forestry. Any young American forester curious to know what manner of men created his profession in America would be well repaid to read this issue.

Forest Terminologies Published

Two items of more than ordinary interest were published in the JOURNAL during its first two years. The first part of *Forest Terminology* was published in the January 1917 issue, the report of a special Society Committee of which Dr. Fernow was chairman. The *Terminology* contained 32 pages. It included terms used in general forestry with the exception of protection and utilization. Following the definitions of many of the terms were their synonyms in German and French, an indication of the still considerable influence of European forest practices on American forestry.

RAPHAEL ZON



SAMUEL T. DANA

The second part of the *Forest Terminology*, "Terms Used in the Lumber Industry," appeared in the January 1918 issue. It contained 75 pages.

Both of these terminologies were sold as separate reprints; Part 1 for 25 cents, and Part 2 for 50 cents.

Dr. Zon Becomes Editor

The next change of record was the appointment of Dr. Zon as editor-in-chief effective March 1923, following the death of Dr. Fernow in February.

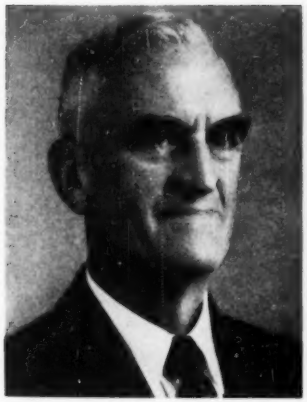
No further changes in the editorial staff are recorded until May 1925. Messrs. Moore, MacDonald, and Toumey retired, and four new names were added: Aldo Leopold, forest economics and recreation; G. Harris Collingwood, forestry education and farm forestry; Carlos G. Bates, silviculture; and Franklin Moon, forest protection. In October 1926, John A. Ferguson replaced Mr. Collingwood as associate editor of forestry education and farm forestry.

A reorganization of the Editorial Board occurred early in 1927. The March JOURNAL lists Messrs. Zon, Fritz, and Bates as continuing members. The new additions were Ward Shepard, economics and recreation; W. G. Wright, mensuration; R. C. Hall, finance; C. M. Granger, policy and administration; Henry Schmitz, education; and Shirley Allen, Society affairs.

Business Office Established

In May 1928 Miss L. A. Warren became the Society's first permanent employee and set up a business office. Taking over the business management of the JOURNAL, she relieved the editor of the many details of seeing the magazine through the press, dealing with the printer, checking proofs, handling correspondence about advertising, and developing advertising accounts.

When, in the spring of 1928, Dr. Zon resigned as editor-in-chief, he was succeeded by Samuel T. Dana of the School of Forestry and Conservation, University of Michigan. In commenting on Dr. Zon's retirement, Dean Dana wrote, "A great editor has retired. To Raphael Zon is due primarily the effective leadership which the JOURNAL OF FORESTRY has exercised in the development of forestry in the United States and its enviable reputation abroad. His high ideals, his broad sympathy, his firm belief that truth is to be found only in the clash of divergent opinions, and his unfail-



EMANUEL FRITZ

FRANKLIN W. REED

ing good judgment have combined to make the JOURNAL a powerful and stimulating force. No one will begrudge him the rest he has so richly earned; every one will regret that he is no longer at the helm."

S. T. Dana Named Editor

Following Dean Dana's appointment as editor-in-chief, further changes are listed in the April 1929 issue when R. C. Hall and C. M. Granger retired from the board. The new associate editors were John H. Hatton, wildlife and recreation; Walter C. Lowdermilk, forest influences; and E. O. Siecke, forest protection and administration.

In a report of the Editorial Board given in December 1929, Dean Dana announced the following editorial policy:

> The function of the JOURNAL is to record current developments and opinions in all branches of the profession. To do this adequately means that foresters of every age, position, and field of activity must express themselves freely. The JOURNAL OF FORESTRY constitutes an open forum through which facts and ideas can be brought to the attention of the entire profession, and will fulfill its mission only when used freely for this purpose.

This statement is as appropriate in 1952 as it was in 1929. The editors of the JOURNAL are still sticking to this policy.

Emanuel Fritz Appointed

By October 1930 Dean Dana had retired as editor-in-chief. Emanuel Fritz of the University of California School of Forestry succeeded him. The associate editors were now Messrs. Bates, Hatton, Lowdermilk, Schmitz, and Wright, together with three new appointees: Arthur Koehler, forest utilization and wood technology; Paul A. Herbert, economics and policy; and Burt P. Kirkland, returned to the Editorial Board in charge of protection and administration.

A business detail, but an important one, was announced by the editor-in-chief in 1930. A change of printers was made during that year "with the saving of a substantial sum." The new printer was the Monumental Printing Company of Baltimore. This company has printed the JOURNAL and other Society publications continuously since that year. The services that the company have rendered the Society during the past 22 years have been consistently efficient and economical.

No further changes are recorded until the October 1931 issue, when George W. Peavy is listed as a new associate editor. And in October 1931 Ralph C. Hawley had been appointed in charge of dendrology, silvics, and silviculture in place of Mr. Kirkland.

After eight years as an associate editor and three years as editor-in-chief, Emanuel Fritz found it necessary to resign, recommending that the editorship be made a full-time job. He served through the February 1933 issue.

F. W. Reed Interim Editor

To succeed Emanuel Fritz, Franklin W. Reed, executive secretary of the Society, was tendered an *ad interim* appointment as editor-in-chief, and so served through March 1934. Upon the resignation of George W. Peavy as associate editor of forest protection and administration, Henry Clepper was appointed to fill the vacancy as of October 1934.

Herbert A. Smith Takes Over

Another reorganization occurred in the winter of 1934-1935; beginning with the April 1935 issue Dr. Herbert A. Smith of the U. S. Forest Service is listed as editor-in-chief with Franklin W. Reed as managing editor. Eight associate editors were now listed: John H. Hatton, wildlife and recreation; Ralph C. Hawley, dendrology, silvics, and silviculture; Paul A. Herbert, economics and policy; Arthur Koehler, utilization and wood technology; Walter C. Lowdermilk, forest influences; Henry Clepper, protection and administration; Henry Schmitz, forest entomology and pathology; and W. G. Wright, mensuration and management.

Later in the year Paul A. Herbert withdrew from the board, and economics and policy manuscripts were handled by the editor-in-chief and managing editor. Arthur Koehler also withdrew and was replaced by Raymond D. Garver. When John H. Hatton resigned, beginning with the March 1936 issue Aldo Leopold was listed as associate editor of wildlife and recreation. In the same issue William N. Sparhawk is listed as a new associate editor, handling forestry literature and bibliography.

The extent to which the job of editing the JOURNAL had increased over the years was emphasized by Dr. Smith in his report of December 1936. When tendering him the appointment, the Council had budgeted an annual honorarium of $1,000 for the editor-in-chief. But upon his acceptance of the assign-

HERBERT A. SMITH

ment the Forest Service had generously authorized him to make the work part of his official assignment. Accordingly, Dr. Smith did not accept the honorarium except to use it as a fund from which his travel and incidental expenses were reimbursed. In both years the major part of the appropriation was unexpended. Having found it necessary to give half his time to the JOURNAL during the two previous years, he felt obligated to resign the editorship in order to complete unfinished work for the government.

Schmitz Succeeds Smith

When, in the spring of 1937, Dr. Smith resigned as editor-in-chief, he was succeeded by Henry Schmitz of the University of Minnesota School of Forestry whose former duties as associate editor of entomology and pathology were taken over by J. S. Boyce. With the May issue F. X. Schumacher had replaced W. G. Wright who had handled mensuration and management for ten years. In May Henry Clepper, who had been appointed executive secretary of the Society, was named the managing editor.

To stimulate interest in technical writing among foresters and to assist them in overcoming the difficulty of preparing manuscripts in a form acceptable for the JOURNAL, the Society in 1938 published a 32-page bulletin, *Suggestions for Contributors*. Compiled by Henry Clepper, this style manual was offered free to members and sold for 25 cents to nonmembers. The edition of 1,000 copies became exhausted in a few years, and is now out of print. A new issue is currently in preparation.

Beginning with the January 1938 issue Arthur A. Brown became associate editor of forest protection and administration. Two new associate editors were appointed with the July 1939 issue—R. Clifford Hall and George Stewart; and a year later Joseph Kittredge, Jr. succeeded Dr. Lowdermilk who had resigned.

The size and format of the JOURNAL were changed beginning with the 1939 volume. A larger page size, permitting wider columns of type, was the principal innovation. The new format was adopted as being more in line with trends in the printing of scientific and technical journals. The wider columns made for better readability, and the larger page size permitted better display of tables, graphs, and illustrations.

Another advantage was the reduction in the number of pages per issue from 96 to 80 without decrease in editorial contents. An annual saving in publication costs of about $1,000 was the result.

At the start of 1942, the fortieth year of publication and the first full year of World War II, the JOURNAL had an editorial staff of ten, departmentalized as follows: Henry Schmitz, editor-in-chief; Henry Clepper, managing editor; J. S. Boyce, forest entomology and forest pathology; Arthur A. Brown, forest protection and administration; Raymond D. Garver, forest utilization and wood technology; R. Clifford Hall, forest economics and forest management; Ralph C. Hawley, dendrology, silvics and silviculture; Joseph Kittredge, Jr., forest influences; Aldo Leopold, wildlife and recreation; F. X. Schumacher, forest mensuration and experimentation; William N. Sparhawk, forestry literature and bibliography; and George Stewart, range management and range research.

HENRY SCHMITZ

S. T. Dana Returns

Henry Schmitz, who had served as an associate editor of the JOURNAL since 1927, and as editor-in-chief since 1937, was elected president of the Society for the two-year term 1942-1943. Accordingly, he was succeeded in July 1942 as editor by Samuel T. Dana, of the School of Forestry and Conservation of the University of Michigan, who had previously been editor-in-chief during the period 1929-1930.

Editing and publishing the JOURNAL during the years of World War II was not made easier by the necessity for paper rationing and other governmental restrictions. However, the alloted paper quota was sufficient to permit continuation of approximately the same number of pages as had been printed during the late prewar years; hence there was no lessening of the number of articles published.

The only change in the editorial board during this war period occurred when Henry Clepper, managing editor, was granted leave of absence to serve with the War Production Board from August 1942 through December 1943.

It was during Dean Dana's editorship that the popular innovation—the "We Present" biographical sketches—was conceived and introduced. Beginning in the February 1945 issue with a two-page biography of Lage Wernstadt, a

retired Forest Service forester and engineer and the inventor of one of the early devices used in aerial photogrammetry, this feature has continued intermittently to appear whenever suitable material is available.

In announcing this feature, Dean Dana described it as "the first of a continuing series of sketches that the JOURNAL OF FORESTRY plans to present concerning interesting people, living or dead, of various nationalities, ages, and degrees of prominence, whose contributions to the development of the profession merit recognition." To date, 70 "We Present" sketches have been published.

It was also during Dean Dana's term as editor that there was begun, in the January 1945 issue, the monthly appearance of one to two pages of new publications in forestry and related fields. Under the heading "Current Literature," this department has been compiled by Martha Meelig, librarian of the College of Forestry at Syracuse. Subsequently, Miss Meelig was assisted by Frances Flick of the library of the U. S. Department of Agriculture.

Hardy L. Shirley

After having twice served as editor-in-chief for a total of six years, Dean Dana resigned and was succeeded by Hardy L. Shirley, assistant dean of the College of Forestry at Syracuse University, in May 1946. With Dr. Shirley's appointment, another reorganization of the editorial board occurred.

HARDY L. SHIRLEY

C. Frank Brockman replaced Aldo Leopold as associate editor for forest recreation and wildlife.

Harold G. Wilm replaced Joseph Kittredge for forest influences and soils.

J. W. B. Sisam was named editor for world forestry, a new assignment reflecting the growing interest of American foresters in forestry abroad.

Axel G. Lindh was appointed to review manuscripts on forest fire control.

Carl E. Ostrom replaced Ralph C. Hawley in the field of silviculture.

Frank H. Kaufert replaced J. S. Boyce for forest entomology and pathology.

W. N. Sparhawk continued on the board handling forestry literature and reviews.

Albert C. Cline replaced R. Clifford Hall for forest economics and policy.

A. Raymond Kienholz was appointed associate editor for forest management.

Herbert B. McKean replaced Raymond D. Garver for forest and wood utilization.

This editorial staff of ten was increased later in 1946 by the addition of three more specialists:

L. A. Stoddart became associate editor for range management.

S. R. Gevorkiantz was named for forest mensuration.

William D. Hagenstein was appointed for private forestry.

No further changes were made until August 1948 when W. N. Sparhawk resigned as book review editor. Thereafter this department was handled by the managing editor.

A Period of Adjustment

In his report of December 1948 to the Society, Dr. Shirley made certain interesting comments which are worth repeating because they emphasized the current problems confronted by an editor-in-chief, whose services were given gratuitously, during a period when the JOURNAL was undergoing significant changes in its efforts to keep pace with rapid developments in the profession.

The cost of printing the JOURNAL had increased by more than fifty percent. Manuscripts were being received twice as fast as they were being published. Coverage of certain increasingly important fields, particularly private forest management, was inadequate.

By necessity the Editorial Board had adopted a stricter policy on editing and rejecting manuscripts. During the previous 13-month period, Dr. Shirley said, 158 articles had been received of which 38 were rejected and 40 were returned to the authors for revision. The extent to which the JOURNAL had grown in scope and size is evidenced by the total number of items published during this same 13-month period: 102 leading articles, 13 editorials, 56 fillers, 54 notes, 12 "We Present" sketches, 27 contributions to Points of View, and 79 book reviews, in addition to a monthly page of announcements of new literature and the departments of Society Affairs and Forestry News.

Commenting on some of the handicaps of an unpaid, part-time editor, Dr. Shirley reported that manuscripts were received by the editor-in-chief at the rate of 26 a month, or one for each working day. "Editing manuscripts, cor-

HENRY CLEPPER

responding with associate editors, and with authors, scheduling material for publication, preparing editorials, and the multitude of other tasks that fall to the lot of the editor require about forty hours of my time for each issue," he said, and added, "It requires the same amount of time of my secretary. . ."

It had become increasingly evident that the job of editing the JOURNAL had grown beyond the era when it could longer be done on a part-time basis by a busy man contributing his services gratuitously. Moreover, there were other editorial jobs to be done for the JOURNAL involving the compilation of Society Affairs and Forestry News departments, which were the responsibility of the executive office, and additional editorial duties for the Society such as the issuing of other Society publications, the preparation of news releases, and the writing of articles about forestry for other periodicals and books at the request of their publishers.

At a meeting of the Council in June 1948 the need for a full-time paid editor was quite apparent. Although the finances of the Society did not then permit the employment of an editor, the filling of this position on a permanent basis was set up as an objective. Specifically, the Council voted unanimously to approve "the establishment of a staff office on publications with qualified personnel as the next major expansion of the budget." As will be seen later, it was not until two years had elapsed that finances permitted the employment of a paid editor, and then only on a part-time basis; and it was not until the fall of 1952 that a full-time, paid editor was obtained.

Henry Clepper, Editor *pro tem.*

After three years as editor-in-chief Dr. Shirley resigned, effective May 1949. During the following nine months the editorial responsibility devolved upon Henry Clepper, the managing editor who, of course, was responsible also for his main job of executive secretary of the Society. With her customary loyalty and efficiency Miss Warren, the business manager, handled the mechanics of printing and distribution, and helpful assistance was given by Robert D. Hostetter, assistant executive secretary, especially with the Society Affairs section. Whereas this arrangement proved to be reasonably satisfactory as an interim measure, it was manifestly unsatisfactory on any long continued basis.

ALBERT G. HALL

Meanwhile, another change in format became desirable in order to provide more flexibility in the use of illustrations, to obtain additional space for tables and graphs, and to permit the use of larger, standard-size plates and displays for increased advertising. The format finally adopted, the one presently in use, was put into effect with the January 1950 issue, Volume 48. For the first time the new format permitted the publication on each cover of a photograph which would heighten the JOURNAL's appearance while illustrating one of each issue's leading articles.

Albert G. Hall First Paid Editor

In December 1949 the Council authorized the executive secretary to employ the Society's first paid editor, Albert G. Hall, a consulting forester of Washington, D. C., who had until recently been assistant editor of *American Forests* magazine. Although the budget still did not permit Mr. Hall's employment on a full-time basis, an arrangement was worked out whereby he would render editorial services up to the equivalent of three-quarters of his time. He was listed as editor beginning with the issue of February 1950.

The Society's increasing need for special editorial assistance again became apparent because of the necessity of seeing through to publication the typescript of the book *Fifty Years of Forestry in the U.S.A.* In 1945 the Council had authorized the compilation of this book by the Committee on the History of Forestry, in connection with the observance of the Society's 50th anniversary meeting held in Washington, D. C. in December 1950. Mr. Hall worked closely with Robert K. Winters, chairman of the committee, in handling the final editorial details and the mechanics of publication.

Another Society publication issued during 1950 was *Forestry Terminology*, compiled by a special Committee on Forestry Terminology (E. N. Munns, chairman). This glossary of technical terms used in forestry was a revision of the 1944 edition of the same title. As was mentioned earlier, the first terminology had appeared in the JOURNAL in two parts as early as 1917 and 1918.

Coincident with the appointment of Mr. Hall as editor beginning with the February 1950 issue, George H. Hepting became associate editor for forest entomology and pathology, succeeding Frank H. Kaufert who had been elected to the Council.

In June 1950 Harold H. Biswell replaced L. A. Stoddart as associate editor for range management.

In view of the fact that there were no books or other similar publications scheduled for the year 1951, Mr. Hall suggested that during that year his pay basis as editor be reduced from a three-quarters to a one-half time basis. This arrangement was approved by the Council.

With the January 1951 issue Charles C. Buck succeeded Axel

G. Lindh as associate editor for articles dealing with forest fire.

In concluding his annual report as editor at the Biloxi, Miss. meeting in December 1951, Mr. Hall made the following comments on the need for a full-time editorial office:

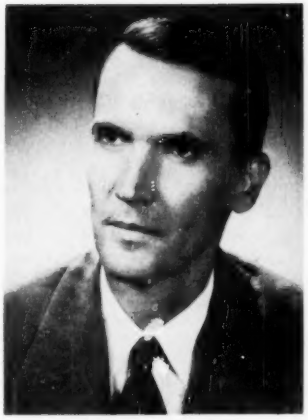
> As your executive secretary has pointed out in his report, the Council has urged the employment of a full-time editor at the earliest practicable date. Following the experience of two years with the JOURNAL in a part-time capacity, your editor agrees heartily with the Council's objective. The Society has grown to the point where volunteer and part-time services are quite inadequate for the job to be done. If the Society through its JOURNAL OF FORESTRY and other publications is to continue to serve the profession in all its aspects and to keep abreast through its publications with the dynamic growth and action in forestry, the time for the establishment of an editorial office is upon us.

With the June 1952 issue Robert K. Winters of the Central States Forest Experiment Station succeeded Albert C. Cline as associate editor for forest economics and policy.

Full-Time Paid Editor Appointed

At the midyear meeting of the Council in June 1952 the executive secretary, who had been directed to prepare a list of possible candidates for the position of full-time editor together with the budget necessary to finance his salary and that of a secretary, presented such a list for the Council's consideration. From the eligible candidates, all of whom had good qualifications, the Council selected Arthur B. Meyer, assistant state forester with the Missouri Conservation Commission, who had had considerable experience in writing for periodical publications and who desired to make his professional career in forestry in the field of writing and editing.

For the record it is explained that Mr. Hall was not a candidate for the editorship on a full-time basis. Mr. Meyer reported for duty on September 4, 1952. Thus the Council finally achieved the objective stated in June 1948 to establish "a staff office on publications with qualified personnel as the next major expansion of the budget."



ARTHUR B. MEYER

Special Acknowledgment

No history of the JOURNAL would be complete without mention of Miss L. A. Warren, the first full-time employee of the Society, appointed in 1928, and its efficient business manager for 24 years. Her consistently thorough supervision of JOURNAL proofreading and secretarial services, her promotion of advertising and other revenue producing activities over the years, and her devoted business management have contributed invaluably to the JOURNAL's success and wide distribution.

Miss Warren's length of service to the JOURNAL has been longer than that of any other member of the Society (she herself is an Associate Member), even exceeding that of the late Dr. Fernow (20 years) and Dr. Zon (21 years).

Circulation and Finances

Forestry Quarterly

During his editorship of the *Quarterly* over a period of 15 years, Dr. Fernow never published actual circulation figures for the magazine. Writing in the issue for December 1910, he said, "The *Quarterly* is still, as it has been for the last eight years, a labor of love, the subscription list having never been sufficient to pay for its publication, since the number of professional readers is still insufficient." But he did not give the size of the subscription list; hence one can only guess as to its numbers. It is probable that at this time (1910), the number of paid subscribers did not exceed 200.

As to the financing of the *Quarterly*, little is known because Dr. Fernow apparently never published a financial statement. That over the years the magazine consistently failed to pay its own way is to be inferred from various editorial statements on the subject.

The first volume of four numbers (May 1902 and January, April and July 1903) was presumably published by Cornell University. Years later Dr. Fernow wrote that the *Quarterly* began "with barely over 100 readers." At a subscription price of $1 per year and 25 cents for single numbers, the periodical from the start was published probably at a deficit even in that era of relatively low costs.

"With its second volume," wrote Dr. Fernow in November 1903, "owing to the closing of the college (at Cornell), the *Quarterly* enters upon an independent career, being published privately under the direction of a board of editors representing the profession at large. . ." The subscription price was advanced to $2 in 1905. It remained $2 during the life of the publication.

In September 1911, discussing editorially "the time when the *Quarterly* must become a montly journal," Dr. Fernow observed "that, without any attempt on the part of the editor—and indeed to the financial loss of the publisher—the quarterly issues are growing in size. . . ." At this time the publisher was listed simply as *Forestry Quarterly*, 396 Harvard Street, Cambridge, Mass. Dr. Fernow himself was then located in Toronto.

Again in March 1912 we find him discussing the financial condition of the magazine. This time he is more explicit. The *Quarterly*, he wrote, "although now in its tenth volume, is still a mere labor of love entailing an annual deficit of one to two hundred dollars. . . ."

In the issue for September 1912

he throws more light on this subject. Pointing out that the subscription list had not grown as he hoped it would, he wrote, "Beginning with barely over 100 readers when it was a one dollar student publication, it has not quintupled its bona fide subscription list, although its distribution reaches nearly the figure of 900."

In short, after a decade of publication the *Quarterly* had about 500 paid subscribers. Apparently some 300 additional copies were being distributed free, or at least being printed and held in inventory.

Perhaps not without justification, Dr. Fernow criticized the profession for its lack of support of the *Quarterly*. The annual balance, he reported, was still "on the wrong side," a condition which he said was not "creditable to the professional spirit or interest."

Reviewing these circumstances forty years later, one must sympathize with and admire the high, dogged spirit of professional zeal that motivated Dr. Fernow and the editors of this struggling periodical. The exact number of persons who might be called professional workers employed in forestry in that year is unknown. But if the *Quarterly* actually had nearly 500 paid subscriptions, this was not a bad record when we remember that the membership of the Society of American Foresters totalled only 254. Up to this time (1912) there had been about 800 degrees granted by American schools of forestry, but of course not all the recipients of these degrees were employed in forestry.

In an editorial appeal for increased support, Dr. Fernow asked each subscriber to find one new subscriber in order to secure a subscription list of 1,000 "which in entire modesty we believe we are at present really entitled to." There is no record that the goal of 1,000 paid subscribers was ever attained; indeed, it is probable that the number actually fell off, for when the magazine was merged with the *Proceedings* four years later the *Quarterly*'s paid subscribers are estimated to have numbered only 370.

During its fifteen years the old *Quarterly* had a peripatetic existence as regards the business aspects of its publication. The business management of the magazine was handled in Ithaca until 1909 when it was transferred to Cambridge, Mass., returned to Ithaca in 1912, and moved to Washington, D. C. in 1913 when the business direction was taken over by the American Forestry Association.

The Proceedings

As to the *Proceedings*, we have more definite information about its circulation and finances. First issued in May 1905, the magazine was sent to every member of the Society and in addition there were doubtless some paid nonmember subscriptions.

This issue also contained the constitution of the Society and a list of members. There were 57 Active Members, 45 Associate Members, and one Honorary Member.

The next membership roster, published in 1907, shows a total of 146 members. It is unlikely that there were enough additional nonmember subscribers to justify publishing more than 200 copies for each issue. The cost for each number issued was 25 cents, a good buy then even considering the relatively high purchasing value of a dollar in that era, for some issues contained as many as 150 pages.

The publications of the Society, then as now, were sent gratuitously to all members. The annual dues were $5 for Active Members. Associate and Honorary Members paid no dues.

Beginning with Volume IV in 1909 the price of single copies was increased to 50 cents.

It was not until 1911 (Volume VI, number 1) that there was published in the *Proceedings* any detailed Society membership statistics or financial reports. The report of Secretary E. H. Frothingham for the calendar year 1910 is therefore of special interest. The membership totalled 200. The Constitution had been amended and the dues had been reduced from $5 to $3.

The annual report of Treasurer S. T. Dana showed receipts of $1,231 and disbursements of $607. The amount spent to publish the *Proceedings* is not shown, though printing and stationery cost $484. We probably are safe in assuming that most of this sum represented printing costs for the *Proceedings*.

More light is thrown on the subject of circulation by the issue of Volume VII, number 1 of 1912. The membership roll totalled 263, all of whom are presumed to have received the *Proceedings*. In addition, the Society had a mailing list of 65 regular subscribers, "exclusive of the Forest Service, which purchases approximately 155 copies of each issue for its field libraries." The treasurer's report showed expenses of $605 for printing the *Proceedings*, out of a total disbursement for the year of $822.

For the year ending December 31, 1913 the secretary reported total membership of 277. During this year the Constitution had been amended to provide for the assessment of $2 annual dues from Associate Members, of whom there were 52, in consideration of the receipt of *Proceedings*. The cost of printing had risen to $872.

Beginning in 1914 the *Proceedings* was published quarterly, in January, April, July, and October. Thus there were now in America two professional publications each appearing four times a year. The *Proceedings* for that year published 34 leading articles together with book reviews, notes, and obituaries for a total of 553 pages. *Forestry Quarterly* for the same year published 38 leading articles plus news items, notes, and reviews for a total of 659 pages.

With two quarterly periodicals serving the forestry profession and in a sense competing with each other, one wonders why, in the interest of professional solidarity as well as of economy, they were not combined. Apparently this idea had occurred to others for we find Dr. Fernow commenting on it in a report submitted to the Society at

an executive meeting in New York on January 11, 1914:

> There is a proposition on foot "to amalgamate these two publications in the American Journal of Forestry, to be published in eight monthly issues, combining the features of the two original magazines.
>
> Such a publication, to be made the official organ of the Society, would become a medium for more lively exchange of views than the two quarterly publications and should greatly stimulate interest among the membership. The details of this proposition, especially as regards the financial aspects, will be submitted to you as part of the business of this meeting.

In the report of Treasurer Louis S. Murphy for 1914 we are given for the first time specific information on the number of copies printed of the *Proceedings* and the cost. That year there were printed in all 2,500 copies—600 copies each of the first three numbers and 700 of the fourth. Their total net cost, including distribution to members and subscribers, was $1,332, or an average of 53.3 cents. Subscriptions and sales brought in $781, the remaining $601 being made up from the dues of active members.

The Editorial Board, of which Raphael Zon was editor-in-chief, recommended that a definite budget be set up—not less than $1,200 and not more that $1,400; and that 800 copies per issue should be printed instead of 600.

The Society's Executive Committee (R. Y. Stuart, chairman), which then functioned much in the manner of the present Council, submitted a report on January 22, 1916 in which it recommended the amalgamation of the two magazines: "It (the Committee) believes that a combination of the journals, to which practically all foresters in the country subscribe or have access, would be beneficial and economical."

Reviewing the Society and *Quarterly* records, the Committee estimated that the prospective press run of the new journal would total 1,200 copies per issue, classified as follows:

Members	336
Subscribers	583
Complimentary and exchange	50
Reserve	231
Total	1200

It was further estimated that, based on eight issues per year, the total number of pages would range from 800 to 1,200. Prospective revenue from members' dues and subscriptions was estimated at from $2,626 to $2,949. The estimated cost for publication and distribution was $2,967.

Finally, the Committee recommended that in order to assure sufficient financial support the dues of Active and Associate Members be increased by at least $1, that the details of publication and policy be left with the Editorial Board, and that the consolidation be effective as of January 1, 1917.

Passing reference was made in the Committee's report to the fact that Dr. Fernow had "sustained a loss" in the publication of the *Quarterly*, but the remark was not further amplified.

Following the recommendations of the Executive Committee, at the annual meeting of the Society held on January 22, 1916 in Washington, D. C., the members voted "That an amalgamation of the *Proceedings* and the *Forestry Quarterly* be made, whether or not an increase in dues is necessary to accomplish it." The treasurer's report showed that publishing and distributing the four numbers of Volume X cost $1,103 of which $938 represented printing costs.

With the issuance of the October 1916 issue (number 4 of Volume XI) the *Proceedings* ceased publication. It was, perhaps, prophetic that the last article to appear in the magazine, under the Society Affairs department, was a long discussion of proposed changes in membership, a subject still being actively debated in 1952.

The JOURNAL

In 1917, when the two periodicals were combined into the JOURNAL, the circulation of the *Quarterly* is estimated to have been 370. The *Proceedings* totalled 631 (members, 347; regular subscribers, 270; student subscribers, 14).

When the JOURNAL began publication it appeared eight times a year; that is, each month except June, July, August, and September. The subscription price was $3 which continued until 1920 when it was raised to $4.

According to the annual report of Treasurer C. R. Tillotson for the year 1917, the Editorial Board exceeded its allotment of $3,000 by $215 in publishing the first volume of the JOURNAL.

Reporting for the Editorial Board, Dr. Fernow said that the eight numbers for the year contained 1,100 pages. "There has been an unusually large contribution of original articles, giving rise to a very large number on the waiting list, in spite of the fact that the other departments were considerably curtailed."

A final quotation from Dr. Fernow's report is of interest: "It is contemplated to enlarge on the department of news, such as would interest the men who have enlisted and gone overseas. . . ." This, it will be remembered, was during World War I, and it is significant that the editor of the JOURNAL, during its first year of publication, recognized the importance to readers of news about the profession as distinct from purely technical articles and notes.

In the November 1918 issue appeared a notice that the War Industries Board had issued an order to publishers of periodicals for a reduction of 15 to 25 percent in paper. To comply with the order the JOURNAL announced that all subscribers would be dropped who were in arrears. As of the end of 1918 there were 935 paid subscribers of whom 350 were included in membership dues.

Beginning in 1935 the JOURNAL embarked on a yearly schedule of 12 monthly issues of 96 pages each. According to the editor, "This enlarged service has been made possible by the improved financial condition of the Society, brought about by the loyalty and support of its steadily increasing membership." In passing one finds it interesting to observe that "the improved financial condition of the Society" was occasioned by a total income for the year of $26,247. Of this amount $7,872 was spent to publish the JOURNAL.

Although the JOURNAL now appeared twelve times a year instead of eight, the subscription price was not raised until 1939 when it went to $5. This rate continued until 1947 when it was increased to $6, the current price.

The circulation of the JOURNAL when it began publication in 1917 was 1,001, including Society members and nonmember subscribers. In 1929 circulation had risen to 2,353. In 1933 it was 2,681; in 1937, 4,783; in 1948, 7,494; and in 1951, 9,512. It is estimated that by the end of 1952 the JOURNAL's circulation will reach 10,000 copies monthly.

While admittedly financial statements do not make absorbing reading for most foresters, one final statistical comparison is of interest. At the end of its first year of publication in 1917, following the merger of the *Quarterly* and the *Proceedings*, the JOURNAL cost $3,215 for printing and mailing; there were probably 700 subscribers. Thirty-five years later, during the fiscal year 1952, the cost of publishing and distributing the JOURNAL, exclusive of salaries, was $36,300; there were more than 10,000 subscribers.

Advertising

Volume 1, number 3 (April 1903) of *Forestry Quarterly* was the first issue to carry advertising—three advertisements. Presumably, payment was made for them because there appears on the third cover the notation *Advertisements. Rates given on application to Business Editor, Morris Hall, Ithaca, N. Y.*

The following issue (July 1903) carried two advertisements for rifles and one for a "war bag" which in 1952 makes interesting reading: "For sportsmen, campers. Holds as much as a trunk. A valise on the cars. A pack-bag in the woods." (Possibly a military surplus item from the war with Spain.)

Although no advertising appeared in the November 1903 issue, one could get rates on application. Doubtless during this early period someone solicited prospects, as several pages of advertising appeared in the February 1904 issue. Although it is questionable whether the circulation of *Forestry Quarterly* at that time was sufficiently widespread to produce many initial inquiries, the magazine continued to carry advertising until the magazine was discontinued.

At least two commercial accounts ran for a number of issues—manufacturers of a cableway skidder and of civil engineers' and surveyors' instrument. Somewhere along the way the rifle ads had been supplanted by the advertising of several forestry schools and, of all things, a bicycle company. No issue of the *Quarterly* listed the advertising rates, and no financial statement is available showing the revenue derived.

The *Proceedings* did not carry advertisements.

JOURNAL Advertising

The first issue (January 1917) of the JOURNAL OF FORESTRY carried four pages of advertising picked up from the *Quarterly* when it and the *Proceedings* were merged. There also appeared this statement: "The editor in charge of utilization (Prof. R. C. Bryant, New Haven, Conn.) will also be given special responsibility in looking after matters pertaining to subscriptions and advertising or, in other words, will serve as business manager."

In the report of the treasurer for that year he made reference to the efforts of the advertising and subscription manager: "The sale of back numbers has been brisk and the first year's advertising campaign has exceeded expectations . . . with an increased subscription list it is probable that it will be easier to build up the number of advertisers. Such concerns as handle sawmill machinery, rifles and revolvers, sporting-goods houses such as Abercrombie and Fitch, houses handling woodsmen's shoes and clothing, and manufacturers of scientific instruments used by foresters should eventually appear as advertisers in the JOURNAL OF FORESTRY."

A financial statement for 1917, published in the issue of February 1918, shows annual receipts from advertising of $131. This financial statement also shows that $50 was allocated for "advertising manager, soliciting advertising and subscriptions" though only $17 was actually expended for this purpose. It is assumed that a special rate was given to educational institutions.

The first volume (1917) carried an average of three pages per issue. Based on eight issues to a volume, we may estimate that advertising revenue was less than $17 per issue, or little more than $5 per page. A slight gain was made in 1918 when the advertising income reached $200. Thereafter the annual income from advertising fluctuated between $200 and $300; the 1927 income was $356.

During the late 1920's Warwick S. Carpenter, Pacific Coast advertising representative of several national publications and an Associate Member of the Society, acted on a nonpaid basis as advertising manager for the JOURNAL. In his report for 1929 the secretary wrote, "For several years Mr. Carpenter has been very generously giving of his time as Advertising Manager, a service that has meant a great deal to the Society. Now with the establishment of the business office, I recommend that the new Council consider the advisability of consolidating the advertising work therewith."

With the setting up of a Society office and paid staff in 1928, a page rate of $50 was announced and advertising rate cards were printed in conformity with "standard rate and data" custom. No concerted effort to obtain advertising was possible because of limitation of personnel. However, several new commercial accounts were obtained producing advertising income for 1929 of over $800, which income was maintained until 1932 when it reached $1,350—where it approximately remained until 1938, when the rate was doubled to $100 per page. After the page-rate increase annual advertising income exceed-

ed $2,000. During the war years this income fell below $1,000, but by 1948 annual advertising revenue had reached $2,500.

As determined by the Council, the first responsibility of the Society's executive office was to promote membership and develop membership services. With limited personnel, time simply was not available to develop advertising accounts. But by 1948 the Council decided that some arrangement should be made to develop advertising income. Upon the election of Clyde Martin as president (1948-1949) he became interested in the project and was instrumental in obtaining the services of Lloyd Thorpe of Seattle, an Associate Member of the Society and a qualified advertising solicitor. In April 1949 an arrangement was effected whereby Mr. Thorpe, as the Society's advertising representative, would solicit advertising for the JOURNAL on a commission basis assuring net income to the Society from this source.

The association with Mr. Thorpe has been profitable for the Society. His efforts have resulted in a steady increase in advertising income. In 1950 he developed the idea of a convention issue of the JOURNAL preceding the annual Society meeting. It has been a successful venture, resulting in 40 to 50 pages of advertising each in the 1950, 1951, and 1952 convention numbers.

There follows the gross advertising revenue for the years 1949-1952. From this gross income are deducted the customary expenses for promotion and solicitation, commissions, and agency discounts.

Year	Gross income
1949	$ 5,100
1950	$10,800
1951	$14,000
1952	$18,000

In May 1952 the advertising rates were revised, the base page rate being increased from $100 to $120. By advertising standards this rate is still low, and another increase probably will be made during 1953 or 1954.

Awards and Prizes

In 1925 the late Charles Lathrop Pack offered a prize of $500 to be awarded at the end of the year, and a like amount at the end of 1926. Under the conditions as determined by the Executive Council, the award was to be made for a paper which would present "in such a way as to be understood by the average intelligent lay leader, the best contribution to the advancement of forestry."

The 1925 winning article was "The Public Relations of Forestry" by Jno. D. Guthrie, published in the JOURNAL for February 1926. Twenty-five manuscripts were received for the 1926 contest, the winner of which was Ward Shepard. His article, "The Necessity for Realism in Forestry Propaganda," was published in the JOURNAL for January 1927.

"A friend of forestry, who wishes to remain anonymous" in 1928 offered the Society $1,250 to be awarded as prizes of $1,000 and $250 "for the best essays describing the present forestry situation in the United States and proposing a nation-wide remedy for its solution." Later the donor was revealed to be Gifford Pinchot.

The two-man award committee (S. T. Dana and Raphael Zon) received 139 essays, and independently each placed at the top of the list a paper entitled "Cooperative Control—a Proposed Solution of the Forest Problem," again by Ward Shepard and subsequently published in the February 1930 issue. The judges withheld the second essay prize "on the ground that none stood out sufficiently from its competitors to deserve the award."

As a result of a suggestion made by S. T. Dana, editor-in-chief, at a meeting of the Washington Section, the Council authorized a prize of $100 to be awarded by a special committee for the best article in the JOURNAL during 1944. The winning paper was "Cutting Cycles in Ponderosa Pine" by G. A. Pearson in the August issue.

Again in 1946 a prize of $100 was awarded for the article "A Proposal for Reorganizing and Realigning Federal Forest, Forage, Park, and Game Lands" by Emanuel Fritz in the April issue.

In 1947 the prize was won jointly by A. C. Hull, Jr. and Joseph F. Pechanec for their article in the August issue, "Cheatgrass — a Challenge to Range Research." The fourth award was made posthumously to Louis S. Murphy for an article which he had written for the January 1948 issue, "States versus Federal Competence." Because of financial limitations the Council did not authorize any more awards.

Cumulated Indexes

In 1927 the Appalachian Section, which comprises the states of Virginia, North Carolina, and South Carolina, and which, organized in 1922, has always been one of the Society's most active Sections, voted to undertake the preparation of a cumulated index to the 11 volumes of the *Proceedings*, the 14 volumes of the *Quarterly*, and the JOURNAL through Volume 27 (1917-1929). The committee which complied this first *Cumulated Index*, published in 1930 and now out of print, consisted of Jesse H. Buell, Verne Rhoades, and Clarence F. Korstian, chairman.

In continuance of this project, the Section again in 1938 voted to undertake the indexing of the JOURNAL for the ten-year period 1930-1939. The *Second Cumulated Index* was completed and published in 1940 at $1 per copy. The committee which did the work consisted of George M. Jemison, Verne Rhoades, and George H. Hepting, chairman.

Once more, in 1950, the Section voted to sponsor the compilation of the *Third Cumulated Index* to cover the 11-year period 1940-1950. The committee appointed to do the work consisted of W. K. Beichler, P. A. Griffiths, R. A. Morin, Lenthall Wyman, and W. D. Miller, chairman. The publication issued in 1952, sells for $2.

The Summing Up

What has the JOURNAL's first half century of service meant to

forestry in America?

From the first *Forestry Quarterly* of 1902, put together by a small group of Cornell students with "barely 100 readers," to the JOURNAL OF FORESTRY of 1952, with an editorial and business staff of 16 and 10,000 subscribers, forestry has developed from obscurity to a position of distinction among the professions. No one can say exactly what effect the JOURNAL has had on this development, but that its role has been considerable no one can deny.

That the JOURNAL enjoys the largest circulation of the world's professional forestry magazines is a statistical fact. That it has frequently set standards for other similar periodicals is widely acknowledged.

There is hardly a book of the past three decades dealing with forest resources, whether a textbook, a scientific treatise, or a popularization of conservation, that does not include references to, or quotations from, the JOURNAL. For, over the years, there has been hardly a technical discovery, or research finding, or new development in forestry that has not been announced, or described, or commented on, in the JOURNAL.

Moreover, the JOURNAL has consistently kept its readers informed of many of the principal developments in specialized and closely related fields, such as, to mention only a few, soil erosion control and wildlife, range, and watershed management. Nor has the JOURNAL neglected major forestry developments abroad. Without ever having aspired to become a world forestry periodical, which is neither its purpose nor its obligation, the JOURNAL has consistently provided space for reports on forestry progress in other lands when such articles contained material of interest to its readers.

In its thousands of pages, written and edited *by* foresters *for* foresters, the JOURNAL has made available a rich and varied body of technical findings, scientific facts, and practical observations. Its influence on applied forestry has been incalculable.

During its 15 years of existence 21 men prominent in the profession helped edit the *Forestry Quarterly*. During its 12 years of publication 37 members of the Society rendered editorial assistance to the *Proceedings*. From 1917, when the JOURNAL started, through 1952, 59 foresters served on its editorial board. In short, the three most influential professional journals in American forestry were edited over a period of a half century by 117 persons.

When we add up those who served as full editors—and they, be it remembered, carried the heaviest loads—the total is unbelievably small. The *Quarterly* had two editors, of whom one served less than a year. The *Proceedings* had three editors. And the JOURNAL had 11 editors, of whom Fernow had been editor of the *Quarterly*, Zon of the *Proceedings*, and Dana had served twice as editor-in-chief.

Considered strictly in their editorial capacities without reference to their official positions, it can be confidently asserted that these 14 men have contributed so substantially to the progress of American forestry that the lengthening shadow of their influence promises to be perceptible well into the next half century. Perhaps the highest praise that can be given them is that they were primarily devoted to their profession, and not to its emoluments.

If this modest history conveys any message at all, it is this:

1. Progress in forestry — for that matter, in any profession—is directly dependent on a sound foundation of research and observed phenomena.

2. The literature of a profession—a fact especially significant to forestry—is one of its greatest assets, for it is the permanent record of the growth of scientific and technical knowledge.

3. From its inception forestry has had the good fortune to number among its practitioners men who realized the necessity for strengthening the professional literature, and characteristically gave devotedly of their time and talents to its service.

4. The JOURNAL *is one—among many — manifestations of professional development. But, because of its uniqueness as a periodical organ for reporting new techniques and other information for the benefit of American foresters, the magazine has had a special responsibility and obligation—not only to keep abreast of new knowledge, but to keep in advance of its possible application.*

5. The JOURNAL *has been, and will continue to be, whatever the foresters of America make it. If forestry's next half century of second growth is as vigorous as that of the past fifty years, the future of the* JOURNAL *is assured and bright.*

L'ENVOI

All American foresters practice a profession based on many years of knowledge accumulated little by little, much of it first recorded in our periodical literature. A newly graduated forester may never have heard of B. E. Fernow, or may have forgotten what he learned about him in college. This is perhaps unfortunate, but it is not important. What is important is that the young forester make good use of the professional literature initiated by Dr. Fernow.

A Tribute to the Editors of the Journal

Ralph S. Hosmer
Charter member; Past President; Fellow.

As an old-timer in forestry in the United States my personal file of our professional magazine goes back, unbroken, to the year 1902—to Volume I, number 1 of the *Forestry Quarterly*. With this background, perhaps I may speak today for the Society as a whole in paying warm and grateful tribute to the series of foresters who, in turn over the years, have given so generously of their time and talents as volunteer editors of the JOURNAL and its parent publications, the *Forestry Quarterly* and the *Proceedings of the Society*.

The total period involved is a full half century. This is a long time in any profession for a group of men to contribute, as Editor, exacting services of high order, with no thought of remuneration or other tangible personal reward. But that is just what these men have given, willingly and gladly, for the promotion of forestry.

Decade after decade, they have maintained the high ideals and strict standards of accomplishment that have always characterized the JOURNAL OF FORESTRY. They have helped mightily to develop our American forestry literature. They have preserved without interruption the spirit of high-minded and impartial fair play that has ever kept the columns of the JOURNAL wide open to the fullest possible discussion of any subject pertinent to the profession, even when, at times, certain of these have tended to become decidedly controversial. And they have ever been ready to meet the expanding needs of the Society by adding to the JOURNAL new departments and other special features.

Further, in earlier years members of the editorial group brought to bear, to a greater degree than most other foresters, influence that helped to advance forestry in this country to the secure position it now holds among the other accredited professions.

Henry Clepper in his article on the history of the JOURNAL in this issue, has put on permanent record the details of this notable story. With two exceptions it would be out of place for me to comment on individuals. But because I had the chance to watch the two pioneer editors at work, at first hand and from close range, I venture to include a note concerning Dr. Bernhard E. Fernow, and his chief lieutenant and successor, Dr. Raphael Zon.

Trained in Germany in the mid-nineteenth century, Dr. Fernow was always actuated by the ideals which underlay the best traditions of German forestry. In founding the *Forestry Quarterly* he set up standards fully as high as those of the technical journals published at the leading German schools. In his editing of the *Quarterly* he demanded a level of accomplishment equally strict. This gave to the *Quarterly*, and later to the JOURNAL, a standing that could have been attained in no other way, as was speedily recognized by foresters in all countries.

Dr. Zon, as editor of the *Proceedings*, was long a leader in editorial matters in the Society. Through his familiarity with many languages, he made available by translations and book reviews material that had not been easily accessible to the members of the Society. As his successor, Zon continued and established Fernow's standards as the policy of the JOURNAL.

To all the members of the volunteer editorial group of the JOURNAL OF FORESTRY all of us in the profession of forestry are under a deep debt of continuing obligation. Holding Dr. Fernow in memory with respect and gratitude, it is a satisfaction to know that to all but two of the later editors this expression of sincere appreciation can be made in person. Let this message go to these men, in the phrase that has become significant through honored use, "Well done."

Editors (1902-1952)

Forestry Quarterly, Proceedings of the Society of American Foresters, and Journal of Forestry

ASA S. WILLIAMS. *Quarterly*: editor-manager, October 1902-July 1903.

BERNHARD E. FERNOW. *Quarterly:* editor-in-chief, November 1903-1916. *Journal:* editor-in-chief, 1917-1922.

ALFRED GASKILL. *Proceedings:* chairman, Committee on Publications, 1905-1906.

RAPHAEL ZON. *Proceedings:* chairman, Committee on Publications, 1907; editor-in-chief, 1910-1916. *Journal:* editor-in-chief, March 1923-May 1928.

HENRY S. GRAVES. *Proceedings:* editor-in-chief, 1908-1909.

SAMUEL T. DANA. *Journal:* editor-in-chief, October 1928-May 1930; June 1942-April 1946.

EMANUEL FRITZ. *Journal:* editor-in-chief, October 1930-February 1933.

FRANKLIN W. REED. *Journal:* editor-in-chief, March 1933-March 1935.

HERBERT A. SMITH. *Journal:* editor-in-chief, April 1935-March 1937.

HENRY SCHMITZ. *Journal:* editor-in-chief, April 1937-May 1942.

HARDY L. SHIRLEY. *Journal:* editor-in-chief, May 1946-April 1949.

HENRY CLEPPER. *Journal:* editor, May 1949-January 1950.

ALBERT G. HALL. *Journal:* editor, February 1950-September 1952.

ARTHUR B. MEYER. *Journal:* editor, since October 1952.

Establishment of Eastern Redcedar by Direct Seeding

Johnson Parker[1]
Department of Biological Sciences, University of Idaho, Moscow.

IT HAS BEEN the vital concern of certain manufacturers of chests, interior trim, novelties, and other such items that a continuing supply of eastern redcedar (*Juniperus virginiana*, L.) lumber be available. For many years the supply has been diminishing, with the result that many cedar users, such as the pencil manufacturers, have turned to other woods for a source of supply. Other manufacturers have still found enough lumber for continued operation.

In this latter group interest has naturally turned toward the establishment of redcedar trees, either by encouraging natural reproduction, by establishment of plantations, or by direct seeding. Natural reproduction is usually limited to areas where the species already exists in some quantity, at least if good reproduction is to be expected (*8*). Plantations have been tried in parts of the Southeast, but many landowners are reluctant to pay the initial cost of planting seedlings, even though seedlings removed in later thinnings can be sold for Christmas trees and larger trees find a ready market in fence posts.

The possibility of direct seeding with this species remains a problem to be investigated. It is the purpose of this paper to record the results of direct seeding on two widely different kinds of soil, under two amounts of canopy cover, and with two soil surface conditions. One such experiment is concerned with screened seed spots in the forest, the second with unscreened seed spots also in the forest, and the third with seeds sown on soils which were brought into the greenhouse.

[1]The writer is indebted to Dean C. F. Korstian for making available the Duke Forest for this work and to Prof. T. S. Coile for the use of the soil sampling apparatus and for help in the location of the soil series.

Methods

Experiment 1.—Seed spots were set out in the forest on two soil series: Iredell and Georgeville. These two series were selected because of their frequent occurrence in the Duke Forest and because they are markedly different in quality.

The Georgeville series is derived from "Carolina slate," a fine-grained volcanic rock that is usually associated with soils that support the best forest stands, including such species as red, white, and black oak with a considerable amount of dogwood in the understory. The series has a permeable, friable B horizon of reddish silty clay and an A horizon of grayish silt loam in forested areas (*9*). The Iredell series, on the other hand, is derived from basic crystalline rocks; sites on this soil are invariably of low quality, usually supporting stands of post and blackjack oak with some redcedar in the understory.

Spots were set out so that there were four replications for each soil series. The replications were separated by another soil series and were about a half mile apart. The canopy types were selected in an area of 1 acre within each of the replications for the two soils, one open, and the other closed. Open canopy was considered to be an opening in the forest about 1/16 acre in area and closed canopy was considered to be an area where the canopy was entirely closed by the branches of trees.

Within each of these 1-acre areas where the two canopy types were located, two seed spots were set out 6 feet apart, one with litter cleared off to the mineral soil and the other with litter undisturbed. Wherever plants grew on the spot these were removed. Each spot was then covered with a conical wire screen 1.5 feet in diameter with 0.3-inch mesh. Edges of screens were buried 1 inch deep and pinned down with galvanized iron wire sections.

Seeds which had been collected from trees in the vicinity, depulped, and stratified for 3 months in moist cloth at 40 degrees F. and those which had just begun to germinate were dropped on the seed spots on February 27, 1948, after winter snows had melted. There were 100 seeds dropped on each spot. A hammer test of these seeds showed that 82 percent were white inside, or sound, and the remaining were brown, or unsound.

Counts of seedlings were made at 2-week intervals for 1 year and at monthly intervals for another year thereafter.

Experiment 2.—In this experiment an attempt was made to determine the success of direct seeding without the protection of screens. Three plots of two spots each were seeded on the same two soil series used in Experiment 1. Seeds were dropped on cleared and uncleared spots, and at the same time as in Experiment 1. One plot of two spots each was in open canopy, one in closed canopy, and the third in an open field for each soil series, giving 12 seed spots in all. Seedling counts were made at the same time as in Experiment 1.

Experiment 3.—A third experiment was designed to test the establishment of redcedar seedlings on Georgeville and Iredell soils in the greenhouse. Soils were sampled from closed canopy areas where the seeds were set out in the previous experiment. Each of four plots or replications on a single soil series were sampled eight times as follows: one part of each plot was cleared of litter, the other left uncleared. Four samples were taken from each part of every plot, giving eight samples per plot, or 32 per soil series. With two soils this gave 64 samples.

Samples of undisturbed soil and litter or of soil with litter already

cleared were made with a steel cylinder which was driven into the ground with a hammer and pried loose with a mattock. The soil cylinder, 4 inches deep and 3 inches in diameter was then drawn free of the cylinder in a cardboard ice-cream container which had been previously inserted in the cylinder. Containers were given a coat of paraffin on the outside and set on a bench in the greenhouse. Light was reduced to 30 percent of full sunlight by means of a lattice roof on the greenhouse and with wire screen over the seedlings.

At the same time as in Experiments 1 and 2, ten seeds were placed on the surface of each sample. These seeds came from the same source as those in Experiments 1 and 2.

Results

Experiment 1.—Results from the outdoor screened spots during the first few months after seeding are illustrated in the upper part of Figure 1. Weather conditions are given on a similar time scale in the bottom part of Figure 1. The decline in the curve showing total numbers of seedlings was coincident with a drought period which continued from about June 6 until the middle of July. The subsequent levelling-off of the curve is related to better soil moisture conditions resulting from July rains.

A statistical analysis of the data of May 15, 2½ months after planting, showed no differences between soils or between canopies as far as survival or establishment of seedlings was concerned. However, establishment was significantly better on soils with litter removed than where the litter was left undisturbed.

By May 15 successful establishment occurred in 8 percent of the planted seeds in closed canopy locations on Iredell soils where the litter was removed and 17 percent in open canopies of corresponding cleared Iredell soils. Only 2 percent showed successful establishment at the same time on uncleared Iredell soils in both closed and open canopy locations. Also by May

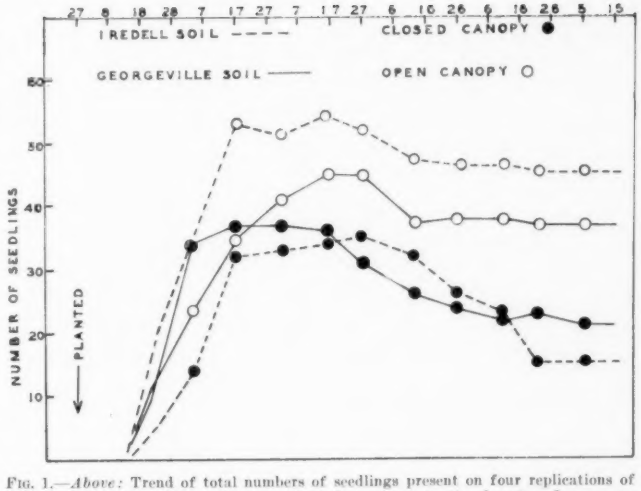
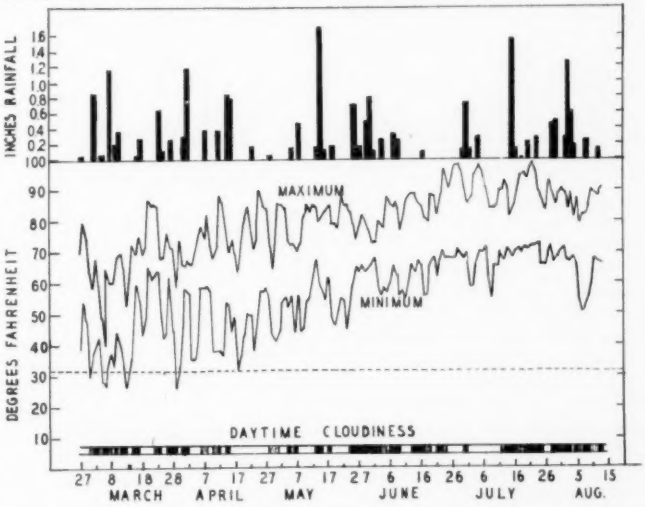


FIG. 1.—*Above:* Trend of total numbers of seedlings present on four replications of cleared spots where 100 seeds were planted per spot in the forest under screens (Experiment 1). *Below:* Rainfall, temperature, and extent of cloudiness (dark is cloudy) from records at the pumping station, Durham, N. C.



15, Georgeville soils had 9 percent successful establishment in closed canopies on cleared soils and 14 percent in open canopies on cleared soils. Only 3 percent became established on uncleared Georgeville soils in closed canopies and 3 percent in open canopies.

In spite of the failure of the statistical analysis to show real differences between canopy types on May 15, canopy differences are indicated by the averages of the data and finally attained significance with the passing of the summer. By the first of August the open canopy spots showed better survival than the closed canopy spots. At this time again no differences were shown between soils.

During the autumn and winter following the first summer after planting about 1 percent of the total seedlings planted were killed by frost-heaving and about 1 percent by desiccation. During March and April of the second year, a year after planting, there was an

increase in total numbers of seedlings amounting to 1 percent of the total seeds planted, caused by the germination of seeds that had remained dormant for a year. This was true of cleared spots, but a much smaller number germinated and became established in the uncleared spots.

During the second summer after planting no mortality occurred, even among the seedlings which germinated and grew in the second spring after planting. Lack of mortality was evidently caused by better moisture conditions the second year.

Experiment 2.—Success of establishment of outdoor, unscreened seed spots on May 15, 1948 is shown graphically in Figure 2 and compared with results of the same date in Experiments 1 (outdoor screened) and 3 (greenhouse). Complete destruction of seeds and seedlings occurred in only 2 of the 12 spots. In some cases empty shells of seeds were found, in others seedlings grew a few centimeters and then were bitten off, presumably by rodents. Seeds that fell into cracks in the soil or were covered with sticks or leaves were more likely to produce successful seedlings than those left exposed.

As in Experiment 1, poor germination was observed on spots with litter intact. The same general decline in seedling number occurred as in Experiment 1, also apparently because of drought. No significant differences between canopy types, including open fields, were shown by the results, nor were there any differences between soils.

In contrast to the results with screened spots in Experiment 1, practically no new seedlings appeared the year following planting, the total number of new seedlings the second year being only 2 out of 1,200 seeds planted. Possibly birds and rodents removed the unprotected seeds that did not germinate the first season.

Experiment 3.—Results of the greenhouse experiment for May 15, 1948, are shown graphically in Figure 2 and compared to results obtained in the forest. The greater

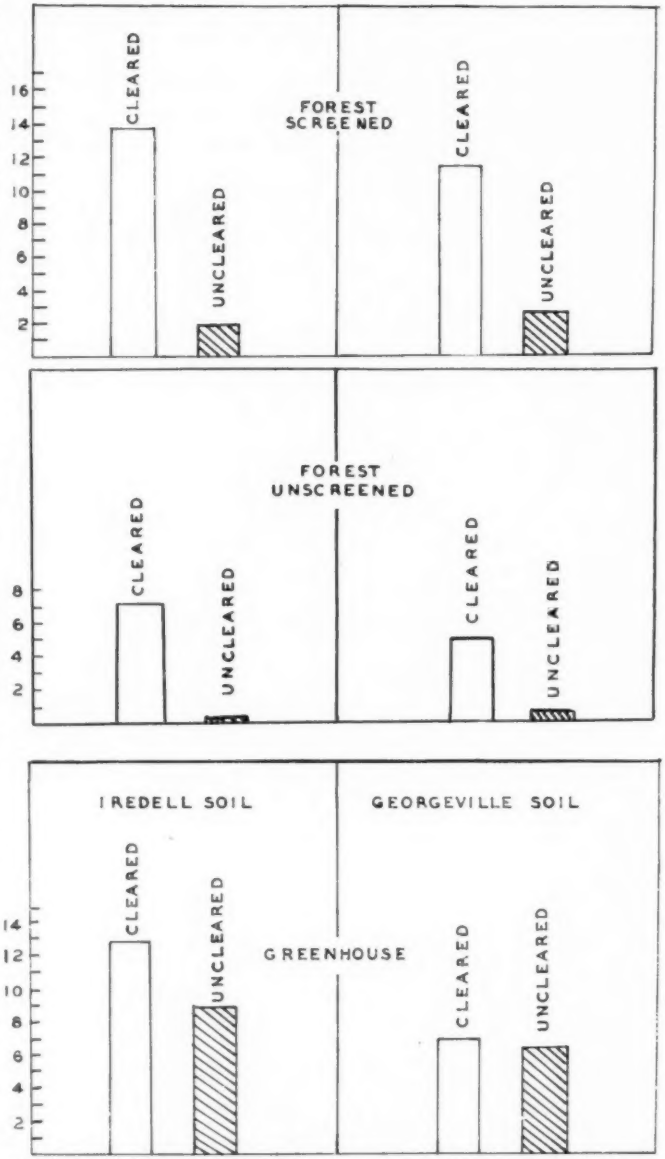


FIG. 2.—*Top:* Seedlings present in the forest on screened spots on May 15, closed and open canopies combined, expressed as a percentage of total number of seeds planted (Experiment 1). *Middle:* Seedlings present on unscreened seed spots under all types of cover on May 15 expressed as above (Experiment 2). *Bottom:* Seedlings present in containers in greenhouse on May 15, expressed as above (Experiment 3).

success of seedling establishment on soils with litter intact in the greenhouse as compared to those in the forest is probably related to the fact that the greenhouse plants were watered with a fine spray from above at 4-day intervals while those in the forest suffered from more infrequent natural rains. The difference in soils suggested by

the graphs was not found to be significant at the 5-percent level. If this can be considered a real difference, it is possibly accounted for by the greater penetrability of the Iredell A horizon than the Georgeville. The latter was noticed to be relatively impermeable in the greenhouse, although this was not necessarily true in the forest.

Seedlings from each soil series were removed from the containers in July and the dry weight determined. No significant differences were shown between soils in regard to total dry or fresh weight of the seedlings. This result suggests that once the seedling becomes established, growth is no better on the Iredell than the Georgeville soils.

Discussion

Although direct seeding of most coniferous species without protection against animals is generally disappointing (*10, 11, 12*), some success with redcedar may be obtained in parts of the Piedmont forest of North Carolina without protection. About half as much success was obtained on unprotected as on screened seed spots. It is possible that the small size of the seed and the lack of a wing make it difficult for animals to locate. Whereas the method thus seems promising, animal populations are known to fluctuate widely from year to year, and the results of two years may not be indicative of results over a longer period.

In this connection results in Germany with direct seeding of *Juniperus communis*, L., which bears seeds similar to those of *J. virginiana*, L. have been fairly successful. Even though rodents and birds are often extremely damaging to seeds in the forests of Europe as well as in the United States (*3*), Lincke (*5*) found that seeds of *J. communis* could be successfully sown in plowed areas or among trees of pole size after the top soil had been dug up.

It appears from the present experiments that seedlings are more likely to survive animal damage than the seeds themselves, but seedlings are then subject to adverse microclimatic conditions. Whether eastern redcedar should be protected in the first year of growth from drying out and other such conditions depends largely on the location, although costs of protection may be prohibitive. A number of writers recommend protection by shading the first year after germination (*1, 2, 7, 14*), but other work points to the hardiness of the seedlings in the first year (*4, 6*). The reason for the hardiness of this species is to be found partly in the deeply-penetrating tap root (*13*) and in the xerophytic nature of the leaves. Unpublished work of the present writer shows that redcedar seedlings 4 months old are much hardier than loblolly pine seedlings kept under exactly the same environmental conditions, both when subjected to drought and when transplanted in moist soils. The loblolly pine came from the Virginia Piedmont, the redcedar from near Durham, N. C.

Summary

Direct seeding of eastern redcedar in the forest on two widely different soils, under closed and open canopies, and with litter removed or left in place showed no differences in number of seedlings established between soil series, whether seeds were screened or unscreened against animals. Seedlings under open canopies, however, survived better than those under closed, and seedlings showed much better establishment on spots where the litter was cleared off.

One year after the seeds were sown, a few more seedlings germinated and became established, but this amounted to only 1 percent of the total number of seeds sown. Survival of both the new seedlings and the 1-year-old seedlings was better the second year, probably because of better moisture conditions.

Seeds placed on soil brought from the forest and placed in the greenhouse showed little better success than those planted in the forest as far as the soils cleared of litter were concerned. Better germination occurred on uncleared soils in the greenhouse than on similar soils in the forest, however, apparently because of the frequent overhead watering of seeds in the greenhouse. There was, in fact, no significant difference between soil surface treatments in the greenhouse. There was also no difference between soil series in the greenhouse, although seedlings had sightly better success penetrating the soil surface of Iredell soils.

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Slash Pine (*Pinus elliottii*), Its Nomenclature and Varieties

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The most commonly planted and one of the most commercially valuable southern pines, slash pine, is a distinct species from Caribbean pine of West Indies and Central America, with which it usually has been united. The related pine of southern Florida, here compared with descriptions of the other two, is different from both. It is formally named as a botanical variety new to science, a rather unexpected discovery.

SLASH PINE (*Pinus elliottii* Engelm.), including its variation "South Florida slash pine" which is distinguished here as a new botanical variety, has been known by several different scientific names. Many botanists and most foresters have applied *Pinus caribaea* Morelet to slash pine of southeastern United States as well as to pines of West Indies and Central America. Others have restricted this name in the United States to the variation in southern Florida and regard the widespread familiar slash pine as a separate species, *P. elliottii* Engelm. or also *P. palustris* Mill., the latter usually applied to longleaf pine. Charles S. Sargent used at different times for slash pine: *P. elliottii*, *P. cubensis*, *P. heterophylla*, and *P. caribaea*.

For some years foresters have known the variation of slash pine in southern Florida which has an almost stemless seedling with grass-like needles, an irregular spreading crown, and very hard wood with thick summerwood, and which is not worked for naval stores products. Early investigators distinguishing this variation include Smith (*10*, p. 205, map opposite p. 187), Rowlee (*7*), Small (*8*, p. 33), and Harper (*4*, p. 361). Later, De Vall (*1*, *2*) made an intensive study of these Florida pines, and West and Arnold (*11*, p. 3) illustrated the differences in seedlings.

South Florida slash pine, the only common pine south of Lake Okeechobee, occupies about 1,750,000 acres of commercial forest land. The recent awakening of interest in the management and genetics of this important tree makes it untenable that its taxonomic status remain in doubt. For this reason the U. S. Forest Service undertook a study of the taxonomy of South Florida slash pine and its closest relatives. Only the conclusions of our study and formal taxonomic descriptions with synonymy and ranges will be given here. A full discussion of history of nomenclature, citation of representative herbarium specimens, and description of our studies of seed, seedlings, needle anatomy, tree shape, wood, oleoresin, and disease resistance will be published by the Southeastern Forest Experiment Station, Asheville, N. C., in a station paper.

Two botanical species can be distinguished: *Pinus caribaea* Morelet (*6*), Caribbean pine, with tropical distribution in West Indies and Central America, and *P. elliottii* Engelmann (*3*, p. 186, pl. 1-3), slash pine, in southeastern United States. The latter is subdivided into two varieties, *P. elliottii* var. *elliotti*, typical slash pine, ranging along the warm temperate Coastal Plain from South Carolina to central Florida and eastern Louisiana, and a new variety *P. elliottii* var. *densa*, South Florida slash pine, in subtropical southern Florida and the coasts of central Florida.

The Investigations

In January 1951 we made an extended field trip over the range of slash pine in southeastern United States, collecting specimens in South Carolina, Georgia, Florida, Alabama, and Mississippi, all the states where this pine is native, except Louisiana. We traveled through Florida along the western part from Pensacola eastward, down the west coast, to Key West, and north along the east coast in studying the variations of slash pine, particularly South Florida slash pine. The senior author made a brief side trip to collect authentic specimens of *Pinus caribaea* Morelet at Isle of Pines (Cuba), the type locality where that species was first collected and described.

At the Harrison Experimental Forest, near Gulfport, Miss., we examined the experimental plantings of young pines from Mississippi, northern Florida, southern Florida, Cuba, and British Honduras made by the Division of Forest Pathology, U. S. Department of Agriculture. Near La Belle, Fla., we studied extensive forests of South Florida slash pine and recent plantings of slash pine from northern Florida made by the Atlantic Land and Improvement Company.

The senior author has examined the herbarium specimens of *Pinus caribaea* and *P. elliottii* in herbaria of the U. S. National Museum and the New York Botanical Garden and material of *P. caribaea* from West Indies and Central America lent by the Chicago Natural History Museum. We also studied the material in the University of Florida herbarium.

The results of our investigations are presented in the formal taxonomic descriptions which follow.

Key to *Pinus caribaea* and *P. elliottii* and Varieties

A. Needles in fascicles of 3 (sometimes 4 or 5 on young trees); cones usually small (5-10 cm. long), with small weak prickles less than 1 mm. long; seeds narrowly ovoid, about twice as long as broad, averaging less than 6 mm. long, wings usually remaining attached—*Pinus caribaea* Morelet, Caribbean pine.

AA. Needles in fascicles of 2 and 3; cones usually larger (7-14 cm. long), with stout prickles 1-2 mm. long; seeds ovoid, less than twice as long as broad, averaging 7 mm. long, wings becoming detached—*Pinus elliottii* Engelm., slash pine.—B.

B. Needles in fascicles of 2 and 3; seedling normal with erect, slender, pencil-like stem—*Pinus elliottii* var. *elliottii*, slash pine (typical).

BB. Needles in fascicles of 2 (infrequently 3); seedling with grasslike, almost stemless stage with very short stem, many crowded needles, and thick taproot—*Pinus elliottii* var. *densa* Little and Dorman, South Florida slash pine.

Descriptions of Species and Varieties

PINUS CARIBAEA Morelet
Caribbean pine

Pinus caribaea Morelet, Rev. Hort. Côte d'Or 1: 105. 1851 (not seen). Morelet, Soc. Hist. Nat. Dépt. Moselle Bul. 7: 100. 1855. Morelet ex Shaw, Gard. Chron., Ser. 3, 36: 98. 1904.

Pinus bahamensis Griseb., Fl. Brit. West Ind. Is. 503. 1864.

Pinus hondurensis Sénéclauze, Conif. 126. 1867.

Pinus recurvata Rowlee, Torrey Bot. Club Bul. 30: 107. 1903.

Pinus hondurensis Loock, So. Africa Forestry Assn. Jour. 18: fig. 2 opposite p. 60. 1949; *nomen nudum*.

Pinus hondurensis Loock, Union So. Africa Dept. Forestry Bul. 35: 210, pl. on p. 209. 1951. Syn. nov.

Medium-sized to large tree about 15-30 meters (50-100 feet) tall and 30-100 cm. (12-40 in.) in trunk diameter, multinodal, with broad round or irregular crown of irregular ascending branches. Bark on small trees thick, rough, furrowed, gray, on large trees becoming fissured into large, flattened, squarish plates, reddish brown and separating off in thin layers.

Buds composed of many linear acuminate, white-ciliate, reddish brown scales; old scales on twig becoming recurved, gray, and broken. Leafy twigs 5-12 mm. in diameter, orange brown when young, becoming brown to gray brown, rough and scaly. Leaves needlelike, crowded and spreading at ends of twigs and remaining attached about 2 years, in fascicles of 3 (sometimes 4 or 5 on young trees, very rarely 2), mostly 15-25 cm. long, 1.5 cm. or less broad, rigid, serrulate, dark or yellowish green, slightly shiny, with stomata in whitish lines on all surfaces; resin ducts 2-8, internal or rarely 1 medial; hypoderm biform, thick, of 3 to 5 layers of cells; sheaths 10-12 mm. long, light brown, becoming brown to blackish, persistent.

Strobili appearing before the new leaves, in January or February, when pollination occurs. Male strobili many, sessile in short, crowded clusters near ends of twigs mostly in lower part of crown, cylindrical, 20-32 mm. long, 5 mm. broad, with 12-18 ovate, scarious margined, reddish brown bracts at base. Female strobili mostly in upper part of crown, appearing near apex of elongating twigs but becoming lateral, 2-4 (1-8) in a whorl and 1-3 whorls formed in a year. Year-old cones (conelets) erect to reflexed on scaly stalks 1-1.5 cm. long, ellipsoidal, 1.5-2 cm. long and 1 cm. broad, the shiny tan scales with a minute prickle.

Mature cones usually reflexed, symmetrical, 5-10 (4-12) cm. long, when closed conical, more than twice as long as broad, and 2.5-3.5 cm. in diameter, when open cylindrical to ovoid and 3.5-6 cm. in diameter, usually deciduous (in some areas persistent a year or more). Cone scales reflexed or wide spreading, thin, flat, dark chocolate brown on inner surfaces; apophysis with a transverse ridge, tan and shiny; umbo small, slightly raised, gray, ending in an inconspicuous small straight weak prickle less than 1 mm. long.

Seeds narrowly ovoid, about twice as long as broad, pointed at both ends, 3-angled; averaging less than 6 mm. long, 3 mm. wide, and 2 mm. thick; usually light colored, mottled gray or light brown; with a membranous brown wing less than 20 mm. long, usually remaining attached.

Seedling normal, with erect, slender, pencil-like stem. Cotyledons usually 6 or 7 (4-9).

Wood hard and heavy, with annual rings, formed in a frostless tropical climate with dry winter season, and with broad summerwood.

There is a small cone race at Pine Cay, Caicos Islands, in southeastern Bahamas, some distance from the large islands to the northwest having pines. The cones on specimens from Pine Cay are only 4-6.5 cm. long. However, specimens with large cones 8-9 cm. long have been collected on North Caicos, also in the Caicos group.

This species was named for its Caribbean location and was first described from Isle of Pines, where it is uncommon and appears to be decreasing in numbers. The common pine for which the island was named is *P. tropicalis* Morelet, also described from there.

Range.—West Indies and Central America. Bahama Islands (six or more, namely, Grand or Great Bahama Is., Great Abaco Is., New Providence Is., and Andros Is. at northeastern end; North Caicos Is. and Pine Cay in Caicos Is. at southeastern end; absent from most of Bahama Is.). Western Cuba, in province of Pinar del Rio. Isle of Pines. Atlantic slope of Central America in British Honduras, eastern Guatemala, northern Honduras, and northeastern Nicaragua. Perhaps also in southeastern Quintana Roo, Mexico.

Loock (5, p. 210, pl. on p. 209) has proposed the new species *P. hondurensis* Loock for the segregate pine of British Honduras and Guatemala and probably also Cuba identified as *P. caribaea*, because it differed from a pine of the latter name from Georgia and Florida in southeastern United States. Though we have not had the opportunity of inspecting the Central American pine in the field, many herbarium specimens including topotypes of *P. hondurensis* Loock from Stann Creek, British Honduras, as well as published descriptions and photographs by Loock and others, have been available for study. We concur that the Central American pine is specifically different from slash pine of southeastern United States, but are unable to separate the former botanically from the West Indian pine, *P. caribaea*. Thus, *P. hondurensis* Loock is a synonym of *P. caribaea* as well as a homonym and perhaps also synonym of *P. hondurensis* Sénéclauze and cannot be maintained. It is the pine of southeastern United States instead, which requires a change in name to *P. elliottii* Engelm. under the International Code of Botanical Nomenclature.

PINUS ELLIOTTII Engelm. slash pine

Pinus elliottii Engelm., Acad. Sci. St. Louis Trans. 4: 186, pl. 1-3. 1880; also reprinted as folio.

Pinus palustris Mill. (Gard. Dict. Ed. 8, Pinus No. 14. 1768) was adopted by Small (9, pp. 4-5) and a few other authors for this species. However, that name generally has been accepted for longleaf pine, though more recently rejected by others as indefinite, and apparently does not apply to slash pine.

This species honors Stephen Elliott, South Carolina botanist who first distinguished slash pine as a botanical variety of loblolly pine, *Pinus taeda* var. *heterophylla* Ell., in his Sketch of the Botany of South Carolina and Georgia (1816-24). Though no type specimen was designated, Engelmann's new name was based largely upon numerous specimens collected by J. H. Mellichamp at Bluffton, S. C., and deposited in several herbaria. Rolla M. Tyron, Jr., of the Missouri Botanical Garden, has informed us that the herbarium of that institution contains 39 sheets, representing various stages and parts, collected by Mellichamp between 1872 and 1880 and labelled *P. elliottii* by Engelmann. Identity of the description, plates, and specimens with slash pine is unquestioned. The generalized specific description which follows includes both varieties.

Small to large tree about 8-30 m. (25-100 ft.) tall and 20-100 cm. (8-40 in.) in trunk diameter, multinodal, with narrow or broad crown. Bark on small trees thick, rough, furrowed, gray, on large trees becoming fissured into large, flattened, squarish plates, orange or reddish brown and separating off along thin purplish layers.

Winter buds about 12 mm. long and 6 mm. in diameter, composed of many linear acuminate, white-ciliate, reddish brown scales, elongating in early spring to form scaly, candlelike twigs almost 1 cm. in diameter; old scales on twig becoming recurved, gray, and broken. Leafy twigs stout, 10-12 mm. in diameter, orange brown when young, becoming brown to gray brown, rough and scaly. Leaves needlelike, crowded and spreading at ends of twigs and remaining attached about 2 years, in fascicles of 2 and 3, mostly 18-25 (30) cm. long, 1.5 mm. broad, rigid, serrulate, dark green, slightly shiny, with stomata in whitish lines on all surfaces; resin ducts 2-9 (11), internal or sometimes 1 or 2 (rarely 4) medial; hypoderm biform, thin to thick, of 2-4 layers of cells; sheaths 12-15 mm. long, light brown, becoming gray, persistent.

Strobili appearing before the new leaves, in January or February, when pollination occurs. Male strobili many, sessile in short, crowded clusters near ends of twigs mostly in lower part of crown, cylindrical, 3-6 cm. long, 5-7 mm. broad, dark purple, with about 11 or 12 ovate, scarious margined, reddish brown bracts at base. Female strobili mostly in upper part of crown, appearing near apex of elongating twigs but becoming lateral, 1-3 (sometimes 5 or more) in a whorl and 1 or sometimes 2 (rarely 3) whorls formed in a year. At pollination, female strobili erect on stout brownish scaly stalks 15 mm. long, ellipsoidal, 11-13 mm. long and 6 mm. wide, pinkish to pale purple, the scales with minute pale green points about .5 mm. long; after pollination becoming darker and reddish purple. Year-old cones (conelets) erect, spreading, or reflexed on scaly stalks 1-1.5 cm. long, ellipsoidal, 15-22 mm. long and 10-15 mm. broad, the shiny tan scales with raised, pointed umbo and with a stout prickle.

Mature cones spreading or reflexed, symmetrical, mostly 6-14 cm. long, when closed conical to narrowly ovoid, mostly more than twice as long as broad, and 3-5 cm. in diameter, when open ovoid to cylindrical and 4-10 cm. in diameter, deciduous. Cone scales spreading or slightly reflexed, thin, flat dark chocolate brown on inner surfaces; apophysis with a transverse ridge, tan to brown, shiny; umbo raised, gray or tan, ending in a stout gray prickle 1-2 mm. long, straight or slightly incurved or recurved.

Seeds ovoid, less than twice as long as broad, pointed at lower end, and slightly 3-angled; averaging about 7 mm. long, 4 mm. wide, and 3 mm. thick; blackish or mottled gray; with a membranous wing 15-30 (35) mm. long, light to dark brown, becoming detached.

Seedling normal or in a variety grasslike and almost stemless. Cotyledons usually 7 or 8 (5-10).

Wood heavy to very heavy and hard.

Range. — Southeastern United States, Coastal Plain from southern South Carolina to southern Florida and eastern Louisiana.

PINUS ELLIOTTII Engelm. var. *ELLIOTTII* slash pine (typical)

Pinus taeda L. var. *heterophylla* Ell., Sketch Bot. S. C. Ga. 2: 636. 1824.

Pinus elliottii Engelm, ex Vasey, Cat. Forest Trees U. S. 30. 1876; U. S. Commr. Agr. Rpt. 1875: 178. 1876; *nomen nudum.*

Pinus elliottii Engelm. ex Sarg., Cat. Forest Trees No. Amer. 74. 1880; *nomen nudum.*

Pinus elliottii Engelm., Acad. Sci. St. Louis Trans. 4: 186, pl. 1-3. 1880; also reprinted as folio.

Pinus heterophylla (Ell.) Sudw., Torrey Bot. Club Bul. 20: 45. 1893. Non *P. heterophylla* K. Koch, Linnaea 22: 295. 1849. Non *P. heterophylla* Presl, Epim. Bot. 236. 1849.

The new name *Pinus elliottii* var. *elliottii* conforms to a change in the International Code of Botanical Nomenclature made in 1950. When a new variety is published, the original element of a species automatically becomes the typical variety with specific epithet repeated. However, in ordinary usage by foresters where this typical, widespread, more northern variety clearly is meant, the shorter name *Pinus elliottii* or slash pine should suffice as heretofore.

Large tree about 15-30 m. (50-100 ft.) tall and 60-100 cm. (24-40 in.) in trunk diameter, with erect, straight axis and narrow, pointed crown. Leaves in fascicles of 2 and 3; resin ducts 2-8 (9), internal or sometimes 1 or 2 medial; hypoderm biform, thin, of 2 (sometimes 3) layers of cells.

Mature cones mostly 9-14 cm. long, when closed mostly conical, mostly more than twice as long as broad, and (3) 4-5 cm. in diameter, when open ovoid and (5) 6-10 cm. in diameter. Cone scales spreading.

Seedling normal, with erect, slender, pencil-like stem.

Wood representative of southern yellow pines, with normal proportions of springwood and summerwood, relatively heavy.

Range. — Southeastern United States, Coastal Plain in southern South Carolina (from Berkeley County southward), southeastern and southern Georgia, northern, western, and central Florida south to Lake Okeechobee, southern Alabama, southern Mississippi, and southeastern Louisiana (west to Tangipahoa Parish).

PINUS ELLIOTTII* Engelm. var. *DENSA Little and Dorman, var. nov.[1] South Florida slash pine.

Differs from the typical variety in its grasslike seedling stage with very short stem, many crowded needles, very thick hypocotyl, and thick tap root; also in its leaves mostly 2 in a fascicle, in its needle anatomy with thick biform hypoderm of 3 or 4 layers of cells, and in its very heavy hard wood with very thick summerwood.

The specific epithet *densa*, dense, refers to the dense, very heavy, hard wood with very thick summerwood; also to the grasslike seedlings with crowded needles, very thick hypocotyl, and thick taproot, and to the thick hypoderm of the needles.

The following specimen deposited in the herbarium of the United States National Museum is designated as the type: *E. L. Little, Jr., and K. W. Dorman 14033*, Sec. 4, T. 45 S., R. 31 E., 20 mi. S.E. of La Belle, Hendry Co., Fla. Duplicates (isotypes) have been distributed to herbaria of New York Botanical Garden, Chicago Natural History Museum, University of Florida, and U. S. Forest Service. Figure 1 illustrates the type collection, and Figure 2, grasslike seedlings from the type locality.

Medium-sized or small (to large) tree 8-26 m. (25-85 ft.) tall and 20-50 cm. (8-20 in.) in trunk diameter, maximum size 31 m. (100 ft.) and 107 cm. (42 in.), with axis often forking into large branches and with irregular flattopped and spreading, open crown. Leaves in fascicles of 2 (infrequently 3); resin ducts 3-9 (11), internal or sometimes 1 or 2 (rarely 3 or 4) medial; hypoderm biform, thick, of 3 or 4 (2-5) layers of cells.

Mature cones mostly (5) 7-12 cm. long, when closed conical to narrowly ovoid, mostly more than twice as long as broad, and (3) 3.5-5 cm. in diameter, when open ovoid to cylindrical and (4) 6-8.5 cm. in diameter. Cone scales spreading to slightly reflexed.

Seedling with a grasslike, almost

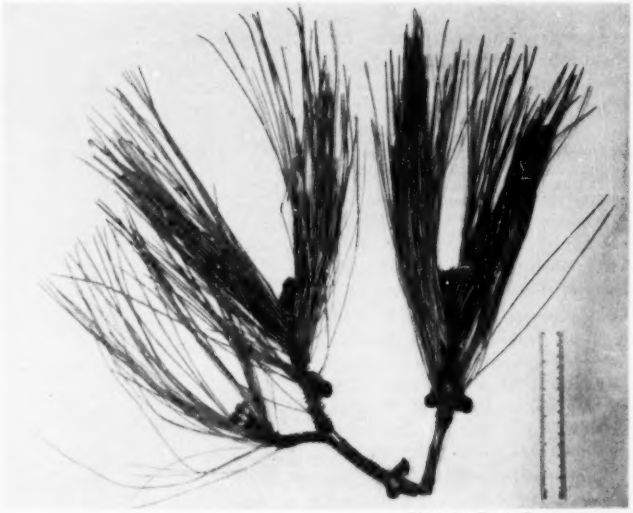

Photo by U. S. Forest Service

FIG. 1.—*Pinus elliottii* var. *densa*, South Florida slash pine, part of type collection (*Little & Dorman 14033*). At left, twig with young male strobili and one-year-old cone. At right, twig with three-year-old cones and female buds. Rule = 15 cm.

Photo by U. S. Forest Service

FIG. 2.—Two seedlings, on the left, of *Pinus caribaea*, Caribbean pine, from Isle of Pines, and three seedlings, on the right, of *Pinus elliottii* var. *densa*, South Florida slash pine, from the type locality in Hendry County, Fla. Rule = 15 cm.

[1] **Pinus elliottii** Engelm. var. **densa** Little and Dorman, var. nov. A varietate typica differt statu juvene graminiforme cum caule perbreve, foliis multis densis, hypocotyle densissima, et radice primario denso; etiam foliis plerumque 2 in fasciculo, anatomia foliorum cum hypodermide densa biforme in 3- vel 4 seriebus cellularum, et ligno ponderoso duro cum parte aestivale densissima.

stemless stage, like that of longleaf pine (*P. palustris* Mill.) for about 2 to 6 years. The many needles are crowded on the very short stem. Below is a very thick structure with rather thick bark, mostly hypocotyl, becoming 1.5-3 cm. in diameter and 3-4 cm. long and tapering into the thickened taproot.

Wood with very thick summerwood, very heavy and hard. Sapwood pale light brown or yellowish; heartwood reddish brown.

On the virgin flatwoods in Hendry and Collier counties, Florida, average height of mature trees is 55 feet with a range of usually 35 to 85 feet and maximum of 100 feet. Average age is 80 years, but age of mature trees exceeds 100 years.

Large trees growing in those flatwoods often have a pronounced swelling at the base of the trunk. At Big Pine Key mature trees on the exposed limestone outcrops are only 15 to 25 feet tall and less than 6 inches in trunk diameter.

Rapidly growing saplings sometimes are unbranched, and lack lateral branches for relatively long-portions of their height and have longer, slightly curving and drooping needles and large buds with whitish scales. These plants resemble longleaf pines and, like the grasslike seedlings, suggest a relationship.

Cones from a few localities in southern Florida (Big Pine Key in Monroe County and places in Dade, Broward and Lee Counties) are smaller, (5) 6-8.5 cm. long, when open are cylindrical and 4-5 cm. in diameter, and have many crowded, slightly reflexed cone scales which expose their inner surfaces and give a dark chocolate brown color and cylindrical shape to the opened cone. Though these small cylindrical open cones seem different, no morphological differences were observed. The cylindrical shape is a result of the cone scales being widely opened and spreading downward. Normally cone scales toward the apex of a cone are less widely spreading and give a gradually narrowed, pointed shape to the opened cone. Large cones of this variety seldom have reflexed cone scales except at the base.

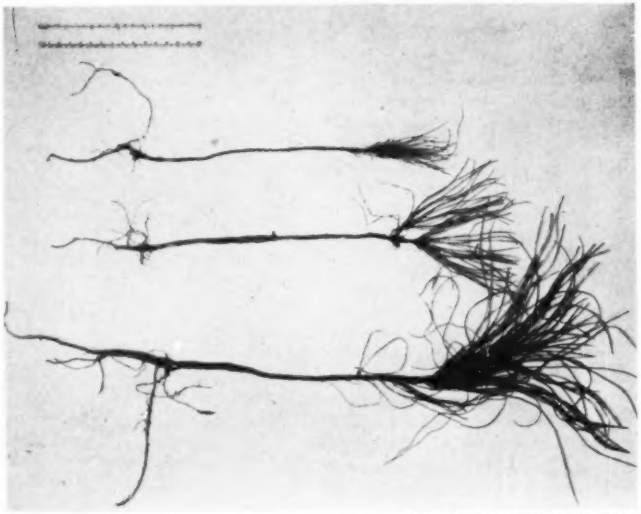

Photo by U. S. Forest Service

Fig. 3.—Three seedlings of *Pinus elliottii* var. *elliottii*, slash pine (typical), from Baker County in northern Florida. Rule = 15 cm.

Range—Known only from Florida; southern part and northward along both coasts in central part. Southern Florida from Lower Florida Keys (Big Pine Key, Little Pine Key, No Name Key, Cudjoe Key, Ramrod Key, Big Torch Key, Middle Torch Key, and Howe Key; not on other Lower Keys or Upper Keys) north to Lake Okeechobee, northward in a narrow strip along Atlantic Coast to Volusia County and northward in a narrow strip along Gulf Coast to Levy County.

Discussion

Seedlings of South Florida slash pine grown from seed at the Harrison Experimental Forest in southern Mississippi retain their grasslike seedling stage. Similarly, seedlings of typical slash pine from northern Florida planted near La Belle, in south Florida, had typical, slender, pencil-like stems. Thus, the grasslike seedling is inherited.

Grasslike seedlings of South Florida slash pine and normal seedlings of native pines in Isle of Pines and north Florida are shown in figures 2 and 3. The very thick structure below the needles apparently is largely hypocotyl (the transition region between stem and root located below the cotyledons and fascicles of leaves). It becomes 1.5-3 cm. in diameter over a length of 3-4 cm. and tapers into the thickened taproot. The unusual thickening is mostly dead outer bark but includes some inner bark and wood. Prominent, long horizontal lateral roots develop from the taproot.

Pinus caribaea Morelet has a normal seedlings with pencil-like stem, as we verified at the type locality, Isle of Pines. However, *P. tropicalis* Morelet, the more common species described by the same author from the same locality, does have a grasslike, almost stemless seedling. Seedlings of these two species were seen growing naturally side by side at Isle of Pines. At Pinar del Rio, western Cuba, where both species are also native, the same differences in seedlings occur, as shown in specimens sent us by Alberto J. Fors. Seedlings of *P. caribaea* are normal also in Bahamas, according to information furnished us by A. C. Shaw, and in Honduras, by Paul J. Shank.

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James W. Girard (1879-1952)

James Walter Girard, of the consulting firm of Mason, Bruce, and Girard, died at Portland, Oregon on November 10, 1952 after a short illness.

Born in Pleasant View, Tennessee, on May 4, 1879, Mr. Girard early entered the logging and lumbering business. In 1905 he left for the West where his first job was as a brush piler in Wyoming. Going on to Idaho and Montana, he worked as lumberjack and mill operator.

In 1908 he entered the U. S. Forest Service as a guard on the Lewis and Clark National Forest and was promoted three years later to forest ranger. After a year in private employment, he resumed work in 1913 for the Forest Service with successive titles of scaler, lumberman, and logging engineer.

From 1923 to 1929 Mr. Girard was general manager of the Herrick Lumber Company at Burns, Oregon. In the latter year, he again returned to the Forest Service in Washington, D. C. as senior logging engineer. In 1934 he became assistant director of the Forest Survey. He served also as consultant to numerous other federal agencies on appraisal and valuation of timber, and on logging engineering.

During World War II, he gave technical consulting service to the War Production Board on production of high specification lumber and lumber products.

In the field of forestry, Mr. Girard had particular interest in timber measurements, marking, and cruising. In 1927 he rewrote the National Forest Stumpage Appraisal Manual which is still considered the most authoritative manual in its line. Again, in 1939 he co-authored the publication, *Timber Cruising*, which has been described as "the best and most practical book on standing timber measurements in the world." He was also the author and compiler of numerous volume tables. The foregoing work is even more remarkable in that Mr. Girard had no formal education in forestry.

A Member of the Society of American Foresters since 1916, he was elected a Fellow, the highest membership honor the Society can bestow, in 1943.

Perhaps there has been no better known forester in the United States than Jim Girard, not alone because of his extensive work and travel in consultation with government and industry officials, but because of his unfailing helpfulness and encouragement to young foresters everywhere. Certainly, there was no forester better loved.

Forest Tree Breeding in Sweden and Other European Countries[1]

Robert G. Hitt
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The University of Wisconsin in cooperation with the Wisconsin Conservation Department in 1948 began a program of forest tree breeding research. The main objective of the work was to improve the genetic quality of the planting stock going into the state's reforestation program. In order to gain first hand information that would be helpful in the planning of a broad program of forest tree breeding research in Wisconsin, a six months trip was made by the author to Sweden and other European countries in early 1951 to study the methods and objectives of European tree breeders. The following portion of the general report of the trip discusses the various factors relative to the establishment and successful operation of a program of forest tree breeding in Sweden and also mentions briefly some of the work in progress at other stations in Europe.

THE TOTAL LAND AREA of Sweden is somewhat less than that of the combined states of Michigan, Wisconsin, and Minnesota. About 55 percent of Sweden's 173,359 square miles is forest land and of the forest area two-thirds is located in *Norrland* or northern Sweden. Each year over 150 million logs are floated down the streams to the mills on the coast. Here pulp, paper, and timber products are manufactured for use in Sweden and for her great export trade. During the period between the two world wars, the value of the Swedish forest export products ranged between 168 and 196 million dollars, or from one-third to one-half of the country's annual export. Sweden is the world's largest exporter of pulp, and is surpassed only by the United States and Canada in production. Over 20 percent of the wage earners in Sweden find employment in some phase of the forest industry.

The immense drain of Sweden's natural forest resources by its industries' desire to supply foreign export markets, plus the slow growth of the trees in the north, caused leaders in the industry to become alarmed. Surveys in central Norrland had indicated that cutting must be reduced about 60 percent in order to prevent serious depletion of the growing stock, especially of trees felled for timber. This cut-back in production would present serious economic and social problems. Something had to be done to increase rate of growth and volume production.

In the search for a solution to this problem, industrial leaders, foresters, and forest owners were impressed by the great strides made in the field of plant breeding in Sweden. An instance of this was the estimated 30 percent increase in yield of winter wheat through progressive plant breeding methods. Plant improvement research is estimated to have added an annual increment of 28 million dollars to the farm income. In terms of the relatively small area suitable for agriculture in Sweden (about nine percent), this represented a significant increase. Why then could not the same results be obtained through a well-planned program of forest tree breeding research? Prominent plant breeders such as Prof. Nilsson-Ehle, Prof. N. Sylven, Prof. A. Gustafsson and others agreed that it could be done. True, the results would not come as quickly as they had in plant breeding, but then this was probably another reason why the work should be started immediately. Further interest was aroused by some work Prof. Nilsson-Ehle had already begun with a naturally occurring giant aspen he had found in southern Sweden. In 1936, therefore, the Swedish Tree Breeding Association was organized. Since that time two additional forest tree breeding research groups have been started in Sweden: the Society for Practical Forest Improvement started in 1941, and the Genetics Department of the State Forest Research Institute started in 1947-48.

Organization

The Swedish Forest Tree Breeding Association is a private organization. An 11-man board of directors, elected at a general meeting, serve for a period of two years and handles the affairs of the association. An executive committee made up of several of the members of the board is ready at call to assist with the routine affairs of the association. The administrative office is located at the breeding station for southern Sweden, at Ekebo, Källstorp, Skåne. The association also operates two branch stations, one in central Sweden at Brunsberg, in Värmland, and one in northern Sweden at Sundmo, Inforsmo, in Ångermanland.

The Society for Practical Forest Improvement is another private organization. The membership includes a number of large forest industries located in central and northern Sweden. In addition several district forestry boards have joined the society. The policies of the society are handled by a board of directors chosen from its membership. Headquarters are at Uppsala in Uppland. Most of the practical and theoretical research is carried out using the lands and facilities of the membership. One center for grafting and other research is at Kratten in Göstrikland. The forestry board of Göteborg, Bohus County has also started work in central Bohuslän. In addition, most of the member companies have some work in progress on their own lands.

The State Forest Research Institute located at Experimentalfältet, near Stockholm, has a new Department of Forest Genetics. The head of the department, in collaboration with the director of the institute and other members of the departmental staff, handle its affairs. In addition to its facilities at Experi-

[1]Paper no. 485 from the Department of Genetics, University of Wisconsin, Madison 6.

mentalfältet, the Genetics Department has access to a large area nearby which is being used for field testing and for the development of an arboretum. The station also works very closely with the Brunsberg Station of the Swedish Tree Breeding Association, utilizing certain of their crossing stages and field trial areas.

Physical Facilities

All the main breeding stations in Sweden have good physical facilities. The offices and laboratories are adequate, and all stations have one or more greenhouses for use in the breeding work. Two of the institutes have drawn plans and have the space available for additional greenhouse units. Nurseries ranging in size from several acres to over 30 acres provide the necessary facilities for growing the experimental material. In addition there are areas available on institute-owned land, or on the lands of private companies and individuals, for use in laying out progeny tests and seed plantations and for establishing breeding arboretums.

The most modern tree breeding station in Sweden is the branch station of the Swedish Tree Breeding Association at Brunsberg. This station was completed and dedicated in 1950 at a cost of slightly over $100,000, the money for its construction coming from the Swedish Diet, the Fund for Forestry Research, and grants from some of the pulp, paper, and timber companies operating in central Sweden. This institute, in addition to its fine offices and laboratories, has a large lecture and assembly room, a seed drying and extracting room, seed storage facilities, a well-equipped photographic laboratory and darkroom, a fireproof room for storing records, several workshops and storage rooms, and even a large laundry room for use by the station employees.

A long corridor connects the ground floor level of the institute building with the headhouse and two greenhouses. A locker and shower room is provided for the workers. The large headhouse provides an abundance of well-lighted and well-ventilated working space. Plans call for the addition of several more greenhouse units to the headhouse. A small nursery is maintained at the institute, with the main nursery located nearby. Several houses are located close to the institute for use by the research staff.

A number of the stations on the continent also have praiseworthy facilities. The Belgian subsidiary of the Swedish Match Company located in Grammont, Belgium, has recently completed a new building, a large part of which is used for tree breeding research. Many of the office, laboratory, and greenhouse facilities in this new building are patterned after those used in the station at Brunsberg. Other institutes on the continent having good physical facilities include the Institute for Poplar Breeding at Casale Monferrato, Italy, the Forest Research Station for Applied Scientific Research at Wageningen, Holland, and the Danish Forest Tree Breeding Research Station, Humlabaek, Denmark. Construction is either in progress or being planned at most of the other stations. Several of the institutes in Germany, Austria, and Italy suffered serious damage to their buildings, equipment, and field trails during the war years, and although reconstruction has been seriously delayed, there is growing optimism that new facilities will soon be available.

Financial Support

The three main sources for the support of the forest tree breeding research in Sweden are: the Swedish Diet, the Fund for Forestry Research, and grants from various pulp, paper, and timber industries, as well as from private contributions. By an act of the Swedish Diet, the Fund for Forestry Research was established in 1946. By this act a fund of nearly 2½ million dollars was appropriated from so-called "price-equalization-fees" collected on forest export products. The annual interest of the fund is used for supporting forestry research and to some extent even the capital may be used. The capital value of the fund, however, must not go below $1,800,000.

Since the Swedish Forest Tree Breeding Association is the largest and oldest tree breeding organization in Sweden, a brief discussion of its budget for the year 1950 may be helpful in indicating the importance of tree breeding in the over-all picture of Swedish forestry research. The total cost for forestry research during 1950, exclusive of that conducted on the refining of timber, i.e. forest products research, is estimated to be in the vicinity of a million dollars. It should not be construed, however, that this amount be considered proportional to the significance of the forests to Sweden's economy. The 1950 budget for the Swedish Tree Breeding Association was around $100,000. This money was used to operate the head station at Ekebo, and in addition the branch stations at Brunsberg and Sundmo. Thirteen professional and semi-professional persons and from 30 to 60 part- and full-time laborers were employed. A brief summary of the society's budget follows:

Expenses

Staff salaries	$32,000
Workers' wages	33,000
Pension contributions	3,800
Office expense	4,000
Insurance	630
Taxes and insurance fees	360
Light and heat	6,270
Travel and auto maintenance	9,000
Freight	545
Consumable items, instruments, and tools	4,570
Field work	1,040
Expenses for real estate	4,070
Inventory expenses during 1950	900
Other expenses	5,815
	$106,000

Income

Membership fees	$ 580
Grants	
Diet	51,250
Fund for forestry research	30,000
Swedish Match Co.	3,750
South Swedish wood industries	1,250
Plant sales	7,270
Income from real estate	2,910
Interest	1,450
Miscellaneous	7,540
	$106,000

The Swedish Tradition in Plant Breeding

One of the outstanding agricultural plant breeding institutions in the world is maintained by the

Swedish Seed Association. The association was formed in 1886 in the parish of Svalöf in southern Sweden. A few years later a similar society was formed in central Sweden. The two organizations were amalgamated in 1894 to form the present organization.

The principal objective of the association is to breed better varieties of farm crops, and through the years scores of improved varieties have been produced and distributed.

The excellent past and current work in the field of farm crop breeding in Sweden can be attributed to the high caliber of the research staff that the association has always maintained. Such famous plant breeders as Prof. Nilsson-Ehle, Prof. Åkerman, Dr. Tedin, Prof. Gustafsson, Prof. Müntzing and others, have been engaged in breeding research at the institute. The association aims to be of the highest service to the farmers of Sweden, and has succeeeded by employing the best plant breeders available.

When the need for research on the genetic improvement of forest trees was recognized and plans were being made for the start of this work, the problem of finding qualified personnel to conduct the research became apparent. None of the professional foresters in Sweden had had training in genetics, and few if any of the plant breeders were trained in forestry. Some of the strongest advocates for starting work in tree breeding were the agricultural plant breeders who realized from experience the gains that could be made. Since no qualified "forester" tree breeders were available, the men selected to take charge of the tree breeding work came from the ranks of the well qualified agricultural plant breeders. The significant results that have been obtained by Dr. Helge Johnsson, Dr. Enar Anderson, Prof. Åke Gustafsson, and others in Sweden or by Dr. C. Syrach-Larsen in Denmark and others, justifies the decision to employ qualified plant breeders to conduct the breeding work even though they were handicapped by a lack of training in forestry. The State Forestry Research Institute, in its desire to have the help of experienced geneticists in planning its program of forest tree breeding research, sought and obtained the services of Prof. Åke Gustafsson. Prof. Gustafsson, however, has not relinquished his duties as plant breeder with the Swedish Seed Association for whom he has worked many years. The excellent program of tree breeding research that Gustafsson has initiated for the State Forestry Research Institute is further evidence of the soundness of the policy of seeking the best plant breeders available for the job.

The attitude of leaders in the forest industry and forest officers is in general very favorable toward these men. One gains the impression, however, that they would like to see men enter the field of forest tree breeding in the future who have been trained in both genetics *and* forestry in order to insure a fuller consideration of the special problems in this field. This is especially important in view of the rather long-term character of forest tree breeding research, the slow growth of forest trees, and the urgent need for offsetting the ever increasing demands being placed upon the forests.

Tree Breeding Objectives

The three main objectives of the tree breeding research in Sweden, as well as in most of the other European countries are (1) to produce trees for reforestation and plantation culture that have improved wood qualities, a faster rate of growth, and which show increased volume production, (2) to introduce and test certain exotic species for possible use in the forest economy, and (3) to produce hybrid and polyploid material that will be of value in reforestation work.

In order to attain these goals, the general pattern of the research work has closely paralleled the methods successfully used in the breeding of farm crops. An inventory of the native forest trees is being carried out systematically as a prerequisite to obtaining the material necessary for evaluating the different climatic types within the country and to enable the workers to select from the natural populations individuals that show particularly desirable characteristics of form, growth, crown type, etc. Clones derived from the selected trees can then be used as parent stock for producing open-pollinated seed of improved quality. In addition, they can serve as foundation stock in producting control-pollinated hybrids.

Several thousand individual tree selections have been made. Scions from many of these trees have been propagated by grafting. The grafts are used for seed production, as parent stock for hybridization studies, as sources of scions for further propagation work, and for specialized studies such as flowering induction, etc.

Leaders in industry and other supporting agencies are joined with the tree breeder in Sweden in the realization that tree breeding research is a long-time undertaking. There are few if any shortcuts. They realize that as in many other phases of forestry, today's efforts and investments in tree breeding research will be posterity's gains. Depletion of present growing stock with little concern for replenishing it eventually would be disastrous to Sweden's forest economy. In planning for the future supply, the policy is generally accepted that the genetic quality of the stock must be a basic consideration.

The Swedish tree breeder is confident that by following the methods used by the agricultural plant breeder he will be in a position after a period of years to release to the state and private forest owners selections of forest tree stock of improved genetic quality. The first gains in tree breeding will not be as great percentage-wise as those obtained in the field of farm crop breeding. Even a 10- or 15-percent increase in volume and quality production, however, will mean a significant gain when the large acreages involved and the continually improving utilization methods are considered.

Stage of Development of the Research Program

The work done in forest tree breeding research since the program was initiated in Sweden in 1936 is praiseworthy and encouraging.

The task of selecting from the indigenous forest species individual trees and stands showing better than the average performance for such characteristics as tree form, rate of growth, volume production, etc., and the inventorying of these trees and stands has been in progress for a number of years. Each stand is given a "plus," "normal," or "minus" rating. Only seed from normal and plus stands is collected for use in the reforestation work. Normal stands have improvement cuttings recommended for the removal of the poorer quality trees so they cannot serve as pollen parents. Individual tree selections are generally of the plus type only, although some selections have been made of normal and minus type trees for particular studies. On the basis of results from progeny tests, reclassification of certain of the selections will be made later, the distinctly superior individuals then being classified as "elite" trees. These trees will then form the basis for establishment of additional forest tree seed orchards. Many of the plus trees have been used in the field as parents for controlled pollinating work, and in addition scions have been collected from these trees for grafting. The grafts are used to establish breeding collections and as stock for potential seed orchards. At many of the stations in Sweden and at other stations on the continent grafted material now flowering is being used to great advantage in the controlled pollinating work (Fig. 1). Some stations, particularly the Danish Tree Breeding Station at Horsholm with Dr. C. Syrach-Larsen in charge, have been much interested in the program of "the estimation of the genotype" of individual forest trees by studying the performance of grafts made from selected trees. The station at Horsholm also has been working on the establishment of seed orchards for the production of forest tree seed of superior genetic quality.

Pine breeding in Sweden has been carried on mainly with the native species, Scotch pine (*Pinus sylvestris*). Crosses have been made between plus, normal, and minus trees in various combinations. Whenever possible these crosses have involved trees in the same general locality as well as trees from more distant regions. Scaffolds were erected around selected trees in a number of areas to facilitate the work until such time as the grafts from these trees begin to flower (Fig. 2). Some interspecific crosses are also being tried using pollen of lodgepole pine (*P. contorta var. latifolia*) of British Columbia origin. Open-pollinated seed of lodgepole pine from various areas in British Columbia has also been introduced to test this species for possible use in Sweden's reforestation program.

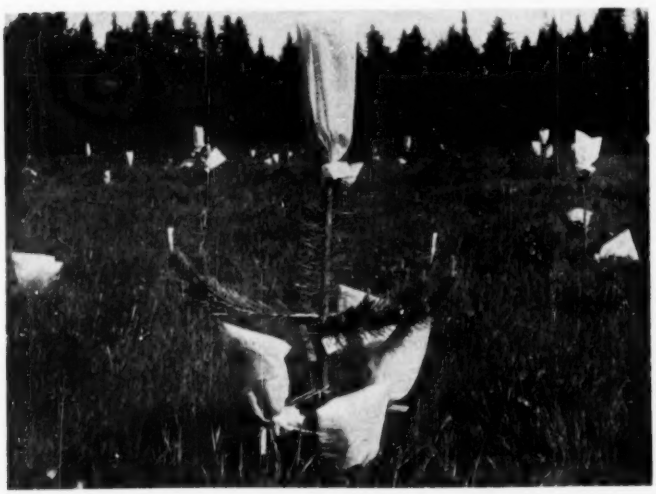

Fig. 1.—A field of *Pinus sylvestris* grafts flowering four years after grafting. The paper bags are used to isolate the female flowers for controlled pollinating work. One graft had 60 female flowers on it. This area is near the Sundmo Station.

Fig. 2.—A crossing stage or scaffold erected around a "plus-tree" selection of *Pinus sylvestris* in central Sweden. Working from platforms on the crossing stage, the tree breeders are able to put 200 to 400 bags on a single tree for use in isolating female flowers for controlled pollinating work.

Many of the other stations in Europe are doing some breeding work with various species of pine. The station at Wageningen, Holland is interested in working with Scotch pine in very much the same manner as the Swedish workers. Several German stations have some work in progress with this species while the station in Austria near Vienna is working with high resin producing Austrian pine (*P. nigra*).

Work with Norway spruce (*Picea abies*), the indigenous spruce of Sweden, closely parallels the pine breeding work. Selection of quality breeding stock, controlled pollinations, progeny testing, vegetative propagation, and seed production are the principal objectives of the research. Several stations in Germany are also working with this species.

Some interest has been aroused in Sweden over the possible use of Douglas-fir (*Pseudotsuga taxifolia*) in reforestation. The interest in this species as a possible forest tree is greater in Denmark, Holland, France, and to some degree in Germany, where many trials are being or have been started. The main efforts are directed toward finding suitable provenances or seed sources that can survive under local site and climatic conditions. In addition, attention is given to selections showing resistance to two different fungi that are known to cause defoliation and death of the trees.

Breeding work with species of *Larix* is also carried on in Sweden. The crosses between European larch (*Larix decidua*) and Japanese larch (*L. leptolepis*) and between European larch and Siberian larch (*L. sibirica*) give promising results. One hybrid (*L. decidua* x *L. Sibirica*) produced by the Ekebo station in Sweden has excellent form, fine branches, and rapid growth, while another hybrid (*L. decidua* x *L. leptolepis*) produced in Denmark and now 15 years old has about 30 percent more cubic volume than does the *L. decidua* of the same age on the same site. The station at Horsholm also has produced some inbred lines of larch which it is hoped will show significant hybrid vigor when outcrossed. Dr. Langner at the station at Arboretum Tannenhoft near Hamburg also has some older hybrids of European and Japanese larch under test.

The line of tree breeding research in progress at all the stations visited (except the stations in northern Sweden and the one near Oslo, Norway) is poplar breeding. There are several reasons for the widespread interest in working with this group:

a. Some of the earlier tree breeding work began with poplar, and the results were impressive.

b. The methods for conducting a program of controlled pollination have been well developed. The work requires little equipment, can be carried out well in advance of the spring flowering season by working in the greenhouse, and the seed is ready for harvest 10 days to 2 weeks after pollination.

c. There are a great many species in the genus *Populus* to work with, and many inter-specific combinations can be made readily.

d. The pulp and match industries are vitally interested in this wood because of its rapid growth and the short rotation necessary.

One of the best hybrids as reported by a number of stations is that involving the European aspen (*Populus tremula*) and the American quaking aspen (*P. tremuloides*). The hybrid is reported to be two to three times as vigorous as either parent species.

Several stations are engaged in building up collections of high-quality trees before beginning large-scale controlled pollination programs. The Poplar Breeding Institute in northern Italy has been conducting a program of controlled pollination for a number of years with good results. Recent findings, however, indicate that selections from natural hybrids give even better results than artificial hybrids. By utilizing natural hybrids a great range of material becomes available from which to make selections, a higher seed germination of the natural hybrids is often encountered, and resistance to disease is found to be more frequent in this material.

Breeding work is in progress with a number of other hardwoods also. Several stations in Sweden and on the continent are interested in the "wavy" or "curly" birch. This characteristic occurs almost exclusively in *Betula verrucosa*, the European birch. The wood is valuable for use in the manufacture of furniture and veneer wood.

Alder (*Alnus spp.*) breeding is another line of tree breeding research in progress at several of the stations. The wood finds limited use in the wooden shoe industry, in the crystal industry, and in the furniture industry. It is a desirable species to use on marshy lands to help dry up the sites. Various stations are working with other hardwoods such as *Quercus*, *Ulmus*, *Fraxinus*, *Castanea*, and *Fagus*. The general objectives are to improve form, increase rate of growth and volume production, find disease resistant varieties, increase seed or fruit production, etc.

Most stations are engaged in one or another specialized research project designed to enlarge the opportunity for forest tree improvement. Several stations have tried colchicine treatments to induce polyploidy in various conifers and a few hardwoods. The results have not been encouraging. Flower induction trials have been undertaken with various species. The tests indicate that root pruning and transplanting give favorable responses. Some workers anticipate making treatments with various chemicals to determine their effect on flower induction. All stations are interested in finding improved methods for the vegetative propagation of breeding material, as well as in discovering better ways of making controlled crosses. The establishment of seed plantations on a scale large enough to be of substantial value in seed procurement is a practical problem which confronts most stations.

Important progress in forest tree breeding is being made in Europe, but particularly in Sweden. Swedish workers have had an advantage in that their country did not become engaged in the last war. The post-war period has been very difficult for most of the stations on the continent. Many of the buildings were damaged or destroyed. Loss of personnel has also hampered operations. In addition, many field trials were partly or completely destroyed. Now that most of these stations have been able to reorganize, it can be expected that in the years ahead many important contributions to the broad field of forest tree breeding research will emerge from them.

An Age-Vigor Tree Classification for Douglas-Fir in Central Idaho

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AS FOREST MANAGEMENT practices become more intensive and forest research adopts increasingly sensitive techniques, the need for developing a system for recognizing the differences in vigor and silvicultural value between individual trees of a species is more keenly appreciated.

The advantages afforded by a well-conceived tree classification for use in stands which are complicated by irregularity in age, understocking, and mixtures with other species have been outlined by Dunning (*1*) who pioneered the development of workable classifications for western tree species. In timberland management the use of such a classification as one of the bases for marking principles promotes uniformity in marking, especially when the intention is to leave a large reserve stand, and permits more detailed consideration of the factors of stand condition and site variation. Using such guides, marking can be adjusted to maintain growth standards through the retention of trees of high growth potentialities and, where means for estimating mortality probabilities are incorporated, through the reduction of potential mortality losses.

In research studies additional advantages are gained from a classification through the simplification of recording and the increased possibilities for making detailed comparisons between areas and tree classes.

The best example of the potentialities of a tree classification employing easily recognizable characteristics is that of Keen (*2*) for ponderosa pine which has been widely accepted and used in management and research. Originally developed to permit the estimation of mortality probabilities in virgin stands, its applicability has been expanded by Briegleb's (*3*) study of growth possibilities by tree classes to afford refinements in growth prediction techniques.

Concurrent with the increasing attention being given to the utilization of Douglas-fir in central Idaho, there has developed a need for a system of tree classification for this species for use as a management aid and as a tool in silvicultural research.

The construction of such a classification necessitates consideration of several of the factors of stand structure and composition that Dunning studied in ponderosa pine since the inland form of Douglas-fir in central Idaho typically occurs in mixture with other species, particularly ponderosa pine; is commonly uneven-aged in structure except where even-aged stands have developed following a fire; and exhibits wide differences in stocking over comparatively small distances.

Present Douglas-Fir Tree Classifications

The need for a classification system for this species has been felt in other regions and three classifications have been proposed. Their adaptation to conditions encountered in central Idaho would require extensive supplementation. Two of these (*4, 5*) have been developed for use west of the Cascades where the coastal form of the species commonly occurs in well-stocked, even-aged stands. Both depend to a large extent on crown position in the canopy for the estimation of relative vigor and, while this is indicative, give insufficient consideration to other evidences of vigor (crown volume, foliage condition, etc.) to permit their being readily adapted for use in central Idaho. Being designed for essentially even-aged stands, they also lack means for relating relative vigor to tree age, which should be considered in a selection type of forest.

Roe (*6*) has developed a tree vigor classification applicable to western larch-Douglas-fir stands in western Montana. Of the present tree classifications, its design and basis would most readily permit its adaptation to fir in central Idaho. However, beyond limiting application to trees at least 100 years old, the relation of age to relative vigor is not considered and would necessitate further investigation. The utility of this classification for localities other than in western Montana has not been studied.

Proposed Classification and Its Construction

This paper presents the results of a study of the external characteristics of the inland Douglas-fir in central Idaho in the form of an age-vigor tree classification. It employs three age classes each of which is subdivided into four vigor classes. This construction permits more detailed estimation of vigor and silvicultural value, from the aspect of comparative growth rate, of trees in mixed, uneven-aged stands than would be possible using the classifications which have been mentioned.

The opportunity for making the study of Douglas-fir characteristics was afforded by a scheduled remeasurement of several methods-of-cutting plots on the Boise Basin Experimental Forest,[1] three miles from Idaho City, Idaho. While these plots are located in the ponderosa pine type on areas rather heavily logged, by present standards, in 1933, some plots had a high proportion of fir in the original stand and retain much of it in the reserve stand. Exploratory studies were made in fir on these plots and most of the basic data for the development of the classification were collected during the 1948 remeasurement.[2]

The quantitative data consisted of measurements of total height, diameter breast high, and total age for each tree. Observations included

[1] Maintained by the Intermountain Forest and Range Experiment Station on the Boise National Forest.

[2] By J. D. Curtis, forester and R. C. Richman, forestry aid.

notes on the crown characters of class, density (amount in percent), shape of top, epicormic branches (presence and amount), foliage (quality and distribution), and dead branch tips (presence and amount). Bark characters studied were growth streaks (newly exposed bark in fissures), roughness (distribution of smooth, scaly, and fissured bark), and bark furrow depth at and near breast height. Four grades or degrees for each of the crown and bark characters were recognized and encoded.

Trees with mechanical, entomological, or pathological injuries, which were considered severe enough in themselves to affect tree health seriously, were excluded from the sample. Trees with such injuries should be removed from the stand wherever possible, but the introduction of subdivisions in a tree classification to include all such defects would be a pointless complication, since the question of their removal rests more on their merchantability than on their vigor status.

The exclusion of these trees left data for 315 trees, ranging from small poles (4 inches d.b.h.) through sawtrees, for preliminary analysis; ages ranged from 26 to 330 years. As a working basis for analysis of bole and crown characters for their utility in estimating vigor, tree vigor was considered to be capable of being estimated in terms of diameter growth for the last ten years. This 10-year growth was computed for each sample tree from the 1938 and 1948 measurements.

When measured in these terms, a given degree of vigor for a mature tree would not be expected to be directly comparable to the same degree of vigor in an immature tree. Furthermore, the possibility that the external indicators of vigor could differ in reliability for mature trees as compared to immature needs consideration. Consequently a separation into age classes, followed by an analysis of vigor characteristics within age classes, appeared advisable.

Tests of average growth rates as related to age indicated that only two age class groupings (0 to 75 years and over 76 years) were statistically justified (7). The attention being given to the possibility of growing Douglas-fir with a rotation of 150 years, however, prompted the separation of the second of these into two age classes (76-150 years and over 151 years). Data on trees over 250 years old were insufficient for setting up a fourth age class.

TABLE 1.—CORRELATION TABLE FOR BARK ROUGHNESS AND AGE CLASSES

Degree of roughness	Age class (years)		
	0-75	76-150	151 +
Code	*Number of trees*		
a	136	9	—
b	19	53	12
c	—	24	43
d	—	3	16

With the large number of possible interrelations, it was appreciated that the complete isolation of single effects was precluded in the analysis of data predominantly of a nonquantitative nature. This difficulty made a field check advisable to evaluate the classification. This field check is described later.

A simple type of frequency analysis, employing correlation tables similar to that illustrated in Table 1, was employed to furnish clues as to which character of bark and crown were related to age, vigor, or both, and as an aid in eliminating the least useful of these. In such tables the closest correlation exists where a line connecting the highest frequencies forms a diagonal. Those characters whose correlation line approached most nearly the diagonal were considered the most reliable indicators of age or vigor status; those whose line departed farther from the diagonal were given less weight.

Within each of the three age classes this means was employed for studying the characters, and the four grades within each, with respect to tree vigor. Since the 10-year growth rates were adopted as the basis for measuring relative vigor, and the average growth rate for trees under 75 years of age was known to differ significantly from that for older trees, the mean growth rate within each of these two age groups, with its standard deviation, was used as a guide in delimiting four growth rate (vigor) classes, on the expectation that in the long run growth rates would be distributed with normal frequency. These growth rate classes were designated A (highest) B, C, and D (lowest) with the mean marking the division between B and C and the mean plus or minus its standard deviation marking the A-B and C-D dividing points. The possibility of using three vigor classes was considered but four were adopted as providing more useful estimates of vigor.

These classes and the degrees of each character permitted the construction of correlation tables (one for each of the ten crown and bark characters) as aids in identifying characters related to vigor and to estimate the strength of their correlations.

This analysis indicated that the characters associated with age, vigor or both were (indicated by x's):

	Age	Vigor	Both
Crown class	(x)[1]	x	x
Crown density	(x)	x	x
Crown percent		x	—
Epicormic branches	(x)		
Shape of top	x	x	x
Foliage		x	—
Dead branch tips	x	—	—
Bark streaks	—	x	—
Bark roughness	x	—	—
Bark furrow depth	x	—	—

[1]Parentheses indicate items with a comparatively low degree of correlation.

Study of the correlations for vigor classes within and between age classes showed that some characters were more indicative of vigor in younger trees than in older ones and vice versa. Age and vigor class descriptions for field checking, similar to those in Tables 2, 3, and 4, were prepared in which these differences in reliability were reflected in the order in which the characters were listed.

Results of Field Check

These descriptions were checked on 201 trees on three areas, all on the Boise National Forest. One of these areas was in the vicinity of the methods-of-cutting plots where the basic data had been collected.

TABLE 2.—RELATION OF FOUR DOUGLAS-FIR CHARACTERISTICS TO THREE AGE CLASSES IN APPROXIMATE DECREASING ORDER OF RELIABILITY

Characteristic	Age class		
	Class 1 (0 to 75 years)	Class 2 (76 to 150 years)	Class 3 (151 years and over)
Bark roughness	Smooth, except for scaly base.	Scaly up to 75% of height. Strong furrowing (more than ¼ inch deep) confined to lower 12 feet of stem.	More extensive strong furrowing than Class 2.
Bark furrow depth (at or near breast height)	Less than ½ inch deep with smooth areas between furrows.	Commonly between ¼ and ¾ inch deep. Showing sectioning of bark at furrows.	More than ¾ inch deep.
Shape of top	Acute angle in silhouette.	Less acute angle but seldom more than 90° in silhouette.	Seldom acute angle; usually more than 90° in silhouette; occasionally flat.
Diameter at breast height	Seldom more than 10 inches.	Seldom more than 26 inches.	
	For areas considered average ponderosa pine Site IV		

Care was taken to avoid reexamining trees which furnished the original data. The other two areas were in stands of virgin timber where the check was made recognizing that differences in tree characteristics between cut-over and virgin timber might limit the usefulness of the classification to cut-over areas only. Ten-year diameter growth was computed from two opposed borings at breast height. Trees which appeared to be borderline cases in respect to age class were also bored for total age. In all cases the trees were classified prior to boring.

Results of the field check are summarized in Table 5. The downward trend in average diameter growth rates from vigor class A (high) to D (low) in each age class and sample area is the most important feature of the table, indicating that Douglas-fir can be classified with appreciable consistency into four vigor classes within three age classes in both virgin and cut-over stands. The presence of this trend in the data from both types of stand shows a growth relationship which is consistent before and after cutting. This feature should make the classification system a particularly useful guide in marking.

Actual average growth rates for age-vigor class 1A are well above those for 2A and 3A but the difference between the latter two classes is not so marked since the dividing line between Age Classes

TABLE 3.—CHARACTERISTICS OF DOUGLAS-FIR (AGE CLASS 1) IN RELATION TO FOUR VIGOR CLASSES IN APPROXIMATE DECREASING ORDER OF RELIABILITY

Characteristic	Vigor class			
	Class A (high)	Class B	Class C	Class D (low)
Bark streaks at breast height	Dull orange-colored streaks occurring in bark furrows at least every 4 to 6 inches around tree or in all four quadrants of circumference of trees less than 10 inches in diameter. Streaks usually ⅜ inch or wider.		Streaks less abundant or narrow, almost lacking.	Streaks seldom present.
Foliage (in midcrown and above)	Needles longer than average, occurring for some distance along branch leaders and on tips of laterals; occasionally of average length with same distribution.	Needles of average length occurring as in Class A; only occasionally with needles longer than average.	Needles of average length, occurring as in Class A or progressively less to condition where they are lacking along many twigs.	
Crown class	Dominant; seldom codominant.	Codominant, occasionally dominant.	Usually codominant; occasionally intermediate or dominant.	Usually intermediate; occasionally suppressed or codominant.
	Trees in open classed as dominant regardless of crown height in relation to neighbors.			
Crown density	Dense crown with none to few large openings.	Dense crown with few large openings to thin or sparse-crowned appearance.	Thin or sparse-crowned appearance.	
	Judged by number and size of openings near bole as seen from some distance and compared to conformation of a young, normal tree.			
Shape of top (in silhouette)	Spirelike.	Acute angle.		Less or more than 90°.
Percentage of total tree height in foliage	35-100%	35-80%		Less than 60%
	Estimate should be increased where crown is wider than average.			

TABLE 4.—CHARACTERISTICS OF DOUGLAS FIR (AGE CLASSES 2 AND 3) IN RELATION TO FOUR VIGOR CLASSES IN APPROXIMATE DECREASING ORDER OF RELIABILITY

Characteristic	Vigor class			
	Class A (high)	Class B	Class C	Class D (low)
Shape of top (in silhouette)	Acute angle.	Large acute angle.	Less or more than 90°.	More than 90°, sometimes flat.
Crown class	Dominant.	Dominant or codominant.	Dominant or codominant.	Codominant, intermediate or suppressed.
	Trees in open classed as dominant regardless of crown height in relation to neighbors.			
Bark streaks at breast height	Fairly abundant orange-colored streaks in bark furrows, or streaks less than ¾ inch wide; streaks occasionally almost lacking.	Narrow and almost lacking; only occasionally fairly abundant.	Narrow and almost lacking.	Usually absent; only occasionally as in Class C.
Percentage of total tree height in foliage	35-80%	35-60%; occasionally to 80%.	35-60%; occasionally less than 35% or up to 80%.	Usually less than 35%; only occasionally up to 60%.
	Estimate should be increased where crown is wider than average.			
Crown density	Dense with few large openings.	Dense with few large openings to thin- or sparse-crowned appearance.	Thin- or sparse-crowned appearance; occasionally dense with few large openings.	Thin- or sparse-crowned appearance; occasionally extremely thin with many open spaces.
	Judged by number and size of openings near bole as seen from some distance and compared to conformation of a young, normal tree.			
Foliage (in midcrown and above)	Needles of average length or longer, occurring for some distance along branch leaders and on tips of laterals.	Same as Class A with needles of average length or shorter.	Same as Class B or needles occasionally lacking along many twigs.	Needles lacking along many of twigs, or as in Class B.

2 and 3, unlike that between Age Classes 1 and 2, was selected arbitrarily. The differences in growth rates between virgin and cut-over stands, most noticeable in Vigor Classes A and B, are probably due to site quality differences although the heavy cutting in the methods-of-cutting plots, in which volume removals ranged between 50 and 96 percent of the original stand, may have been detrimental to post-logging growth in fir.

Observations made in the course of field checking were used to simplify the age and vigor class descriptions to the form given in Tables 2, 3, and 4. One noteworthy deletion made was that of dead branch tips in and above midcrown as indicators of age. In the basic data from the cut-over area there appeared to be some correlation between their numbers and tree age. When checked on the areas of virgin timber they were found to occur in noticeably smaller amounts on trees of all ages and were concluded to be generally inapplicable.

Using the Classification

The Douglas-fir classification presented here is preliminary and is intended to estimate only the relative age-vigor status of trees as related to growth rates. The inclusion of mortality probabilities and average growth rates by tree classes on sites of various qualities for growth prediction purposes, particularly in cut-over stands, remains to be investigated.

The applicability of this classification to inland Douglas-fir, other than in central Idaho, has not been

TABLE 5.—AVERAGE 10-YEAR DIAMETER GROWTH[1] BY AGE-VIGOR CLASSES ON CHECK AREAS

	Age vigor class												Total No. of trees
	1				2				3				
	A	B	C	D	A	B	C	D	A	B	C	D	
	Vicinity methods of cutting plots (cut-over)												
Average (*inches*)	1.65	1.02	0.65	0.38	1.34	1.11	0.57	0.38	0.80	0.68	0.53	0.20	
No. of trees	4	9	8	5	7	10	10	5	1	6	3	1	69
	Gold Fork, China Creek (virgin)												
Average (*inches*)	—	—	—	—	1.30	1.08	0.67	0.37	1.47	0.80	0.54	0.38	
No. of trees	—	—	—	—	10	10	10	3	10	10	10	4	67
	Beaver Creek Summit (virgin)												
Average (*inches*)	2.54	1.52	0.92	0.35	1.52	1.17	0.84	0.25	1.54	1.29	1.17	—	
No. of trees	8	6	4	2	8	10	7	2	7	8	3	—	65
													201

[1]Excludes bark growth.

determined. Similarities in the occurrence of this form of the species in other western regions, as described by Westveld (8) suggest wider possibilities for its application.

In interpreting descriptions, it must be appreciated that no one characteristic is sufficient to classify a tree. As far as possible, the characteristics to be considered have been arranged in descending order of reliability in each table, but classification should not be based only on those near the top of each table. The most satisfactory way of accomplishing this, especially when using the tables for the first time, employs three steps:

1. Getting an impression of the general fit of a tree to each of the characteristics listed.

2. Narrowing each down to the closest description.

3. Summing up the combination of descriptions, giving somewhat more weight to those near the top of the table, to arrive at the age or vigor class.

Experience in field checking showed that the necessity for making arbitrary decisions arises most frequently in the vigor class tables where tree characteristics approach the line between Classes B and C. This minor difficulty is overcome by practice, which tends to develop a mental picture of average trees in each class and obviates the need for frequent reference to the tables.

When used in conjunction with marking rules, it is suggested that the highest priorities for removal be given to 3D and 2D trees, followed in order of decreasing priority by 3C, 1D, 2C, 3B, 1C, 2B, and 3A trees. This arrangement is prompted not only by consideration of growth rates but also by the probability that older trees showing relatively low growth rates will be less likely to improve in this respect if left in the stand than younger trees. For most marking purposes, Table 3 for Age Class 1 can be omitted.

Summary

Present vigor classifications for Douglas-fir are of limited usefulness for application to individual trees in central Idaho stands, mainly because provision for the recognition of age classes is not included. A preliminary age-vigor classification for this species in central Idaho is presented which permits recognition of three age classes and four vigor classes. Basis for the classification consists of measurements and observations on 315 trees reasonably free from mechanical, entomological, or pathological injuries. Field checking on 201 additional trees shows that Douglas fir trees can be classified as to relative vigor within age classes in both virgin and cut-over stands. Suggestions are made for using the classification, particularly as an aid in timber marking.

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Article by L. L. Bishop Published in Paper Trade Journal

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Regulation of Cut in Immature, Understocked Forests

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OVER EXTENSIVE FORESTED AREAS of the United States, the rapid advance of logging in the early part of the current century left behind a characteristically depleted forest resource. Vast areas are typified by relative immaturity of the forest cover, containing remnants of the original stand in the form of single trees or groups of originally valuable species, but of a size originally too small for economic operations, and of other trees of merchantable size even at the time of logging but economically inoperable because of their species. In addition, these areas on the whole are substantially understocked. Except for the remnants, the age-class range tends to be narrow, and in many instances, the age-classes are difficult to map out. In spite of their handicaps these immature, depleted areas are again contributing substantially to the nation's need for forest products and lumber and in some cases, as throughout the South, constitute the bulk of the lands that are now being operated.

The major objective of the forest manager is to handle these areas in such a manner that they will continue to supply and maintain an industry and, even more, to build up the stands in stocking and maturity so that the industry will develop and prosper still further. It would be an economic waste and a futile effort to recommend that these stands remain untouched, under the belief that a prolonged rest is the only cure. Few areas exist where some kind of cutting operation, if conducted rightly, will not accelerate improvement. Without continued current income, neither the forest products industries nor forest management, whose success is controlled by the profitability of industry, can survive.

The very character of the forest, with its great areas of immature timber and its remnants of the original forest, has dictated to a large extent the necessity for partial cuttings, often going under the name of the selection system, but actually a method of improvement-selection cutting. To read the current popular literature and to listen to current discussions, one could easily be led to believe that selection cutting is the only kind of harvest practice that should be tolerated under the name of good forestry. However, the term "selection cutting" and "selection system" are not to be construed as synonymous terms. The first is a method of partial harvesting; in other words the removal of part of the standing timber which is economically operable or which will help improve the quality and condition of the residual stand. The second is technically a silvicultural system of regeneration.

All stands can endure some measure of "selective cutting," but many fewer stands can be perpetuated under the "selection system." By the cutting of single trees or small groups in an immature understocked stand, time is gained in the program of forest rehabilitation, the stands on the whole reach a more desirable harvesting age, but the procurement of reproduction is subordinated to a minor role. Thus temporarily selection cutting, particularly of the improvement-selection nature, can be and often should be employed, even though in the long run the species is not suited to the silvicultural selection system of regeneration. One can almost say dogmatically that for the situation described above, the improvement-selection cuttings represent the best method and in many instances the only method that should be employed for the time being. After the passage of a cutting cycle or two, the situation can be reviewed and if necessary a more appropriate system of regeneration adopted.

The general management problem therefore departs substantially from the classical textbook approach, in which the forest is treated as a relatively stable unit and an attempt is made to fix an annual cut which will prevail throughout the rotation. Here we have a dynamic situation with conditions changing rapidly. Frequent assessment of the resource must be made and the size and nature of the annual cut readjusted. Within recent years great strides have been made in the silvicultural handling of the immature, understocked forest. Many operations, previously unthinkable, have become common practical realities. Stand improvement practices are conducted annually on probably millions of acres. These involve girdling or poisoning of undesirable species to improve growth and to encourage regeneration of desired species; planting of hundreds of thousands of acres annually; extensive commercial thinnings of young stands; preparation of the ground through prescribed burning or disking, and so forth. In addition, steady improvement is occurring in the utilization of minor species and in the development of new products. A calculation of the annual cut made on the basis of an inventory as of now, is soon outdated.

Not all the factors of change are positive; some are negative and markedly so. Damage by fire, hurricane, sleet or ice, and insects are not unusual incidents. I have in mind one operation in the South, where annually for about eight years, one or another major salvage job had to be undertaken. Neither category of change, positive or negative, is fully predictable. We have no accurate measure of the long-term success of the various stand improvement practices or the effects of selection cutting and thinning and we certainly cannot predict the vagaries of catastrophies. The only recourse is to do the best we can under the current situation, then reassess the picture at periodic intervals with the view toward modifying the cutting program.

If the forestry program is at all

TABLE 1.—CALCULATION OF GROWTH OF PINE FOR THE NEXT TEN YEARS FOR THE AVERAGE ACRE

1951 cruise				1951-1960, inc.		Stand 10 years hence					
		Volume		D.b.h.	Mortality	Number of trees					
D.b.h.	No. trees	Per tree	Per acre	growth	percent	Reduced for mortality	Stationary in class	Rising One class	Rising Two classes	Total	Volume per acre
6	17.86										
8	11.85			1.70	4.4	11.04	1.66				
10	9.68			2.32	4.0	9.29	0	9.38		9.38	
12	10.50	90	945	2.54	3.7	10.11	0	7.80		7.90	702
14	7.69	135	1,038	2.61	3.5	7.42	0	7.38	1.49	8.87	1,197
16	5.45	200	1,090	2.58	3.3	5.27	0	5.16	2.73	7.89	1,578
18	3.58	275	984	2.51	3.1	3.47	0	3.74	2.26	6.00	1,650
20	1.80	360	648	2.42	3.0	1.75	0	2.59	1.53	4.12	1,483
22	.96	445	427	2.30	3.0	.93	0	1.38	.88	2.26	1,006
24	.41	535	219	2.19	3.0	.40	0	.79	.37	1.16	621
26	.14	630	88	2.05	3.0	.14	0	.36	.14	.50	315
28	.06	730	44	1.91	3.0	.06	0	.14	.04	.18	131
30	.02	830	17	1.78	3.0	.02	0	.06		.06	50
32		920						.02		.02	18
Totals	69.70		5,500								8,751

TABLE 2.—CALCULATION OF HORIZONTAL CUT FOR THE AVERAGE ACRE

				1951-1955, inc.		Stand 5 years hence Number of trees					
1951 cruise		Volume		D.b.h.	Mortality	Reduced for	Stationary	Rising		Volume	Cumulated
D.b.h.	No. trees	Per tree	Per acre	growth	percent	mortality	in class	one class	Total	per acre	volume
10	9.68			1.16	2.00	9.49	3.99				
12	10.50	90	945	1.27	1.85	10.31	3.76	5.50	9.26	833	7,139
14	7.69	135	1,038	1.30	1.75	7.55	2.64	6.55	9.19	1,241	6,306
16	5.45	200	1,090	1.29	1.65	5.36	1.90	4.91	6.81	1,362	5,065
18	3.58	275	984	1.26	1.55	3.52	1.30	3.46	4.76	1,309	3,703
20	1.80	360	648	1.21	1.50	1.77	.70	2.22	2.92	1,051	2,394
22	.96	445	427	1.15	1.50	.95	.40	1.07	1.47	654	1,343
24	.41	535	219	1.09	1.50	.40	.18	.55	.73	391	689
26	.14	630	88	1.03	1.50	.14	.07	.22	.29	183	298
28	.06	730	44	.96	1.50	.06	.03	.07	.10	73	115
30	.02	830	17	.89	1.50	.02	.01	.03	.04	33	42
32		920						.01	.01	9	9
Total			5,500							7,139	

successful, the modification would indicate an increased possible cut. Continued stability over a rotation period is not a prerequisite, nor is it necessarily desirable. A dynamic situation where the cut is constantly increased, ultimately reaching a desirable optimum, is far more desirable from an economic and industrial point of view. Equipment wears out and must be replaced. Manpower demands constantly increase, owing largely to more and more intensive utilization. New uses are being developed. Strategic planning of mill development is not handicapped, but rather benefited, by the prospects of greater activity. It is always easier to build up and improve an organization than to reduce it.

To sum up, the point of the argument is that regulation of cut under the conditions discussed should not be frozen at a given level, but that repeated reassessment must be made, and the revised annual cut and the proposed methods of operation be based on the situation then prevailing. Short-term evaluations are therefore in order. Temporarily shelved are such major considerations as an appropriate rotation age, the most suitable silvicultural system of regeneration, and the attempt to establish a cut which will be maintained at a constant level over a long period of time. Substituted for these are the most appropriate cutting cycle, the adoption, at least temporarily, of improvement — selection cutting and the determination of an annual cut which will not deplete but rather build up the growing stock and which will increase with succeeding periods. No inference is here implied that this situation has not been realized by foresters, in fact a great awareness exists as evidenced in current management plans and literature.

In the following discussion, a specific routine of calculation will be described that has been found feasible and practicable for the immature, understocked forest placed under the improvement-selection system of cutting. The stand as a whole is treated as an all-aged stand, which it may not be, unless one substitutes all-diameter for the term all-aged. The sequence of calculation starts with the determination of valid growth rates, through the stand protection method, then discusses the determination of the allowable cut by two different methods which yield practically the same answer, and finally shows how the annual cut can be allocated into annual cutting blocks.

Determination of Growth Rates

The primary need in determining an annual cut is that for accurate growth rates. If the forest can be treated as an all-diameter stand, the stand projection method offers the best solution. A well-designed inventory cruise will supply all the necessary data. The following stand table, used for calculation purposes, is assumed to be a

representative stand table for a southern pine tract of 50,000 acres. Growth rates and mortality rates are assumed to have been derived specially for the area in question. The growth rates are the end product of an analysis of increment cores taken randomly through the tract, and include adjustments for deceleration as well as for bark increment. The form of the growth calculation is obviously that of the "rising diameter" kind. A separate calculation would have to be made for the hardwood component of the forest.

In Table 1, the fifth column, "Reduced for mortality," is obtained by applying the mortality percent to the present number of trees, thus showing the number expected to be alive at the end of the 10-year period. These reduced numbers are then divided into two components in the following three columns depending upon the growth rate by the following rules:

1. If growth rate is less than the diameter class interval

$$\text{a. Trees rising one class} = \frac{\text{D. growth}}{\text{D. class}} \times \text{No. trees}$$

b. The remainder stay in the original class.

For example with the 8-inch class

$$\text{Rising one class} = \frac{1.70}{2} \times 11.04 = 9.38$$

$$\text{Remaining} = 11.04 - 9.38 = 1.66$$

2. If growth rate is greater than the diameter class interval

$$\text{a. Trees rising two classes} = \frac{\text{D. growth} - 2}{\text{D. class}} \times \text{No. trees}$$

b. The remainder rises one class

For example with the 10-inch class

$$\text{Rising two classes} = \frac{2.32 - 2}{2} \times 9.29 = 1.49$$

$$\text{Rising one class} = 9.29 - 1.49 = 2.80.$$

The numbers in the three columns are then cross-added by diameter class to show the diameter distribution expected in 10 years. The volumes of Column 3 applied to these numbers give the last column.

The calculation shows that under conditions of no cutting, the volume per acre is expected to increase from 5,500 board feet to 8,751 feet in 10 years time. The 10-year growth factor is 8,751/5,500 = 1.5911 and the corresponding compound growth percentage is 4.75 percent per year. Both of these values will be used later in the determination of the annual cut. These growth rates apply obviously to the entire stand, including ingrowth. Needed also will be growth rates excluding ingrowth. This is obtained by subtracting out the trees contributing to ingrowth. The ingrowth consists of the 7.80 trees in the 12-inch class and the 1.49 trees in the 14-inch class that have grown out of the original 10-inch class. The volume of these trees amounts to 903 board feet and the 10-year volume reduced for ingrowth equals to 7,848 bd. ft. The 10-year growth factor is 1.4269 and the corresponding compound growth rate 3.65 percent a year. Portions of Table 1, the two growth factors and the two compound rates will now be used in determining the allowable annual cut.

"Amortization" Method

Of the several approaches available, attention will here be confined to two specific ideas. Both have been applied on extensive area and have proved successful. These are regulation of cut by the so-called "amortization" formula as proposed by the author[1,2] and the system of "horizontal cut" as proposed by H. H. Chapman.[3] Neither of these has yet been adequately described, particularly as to their detailed application to a case example. Besides, further use and study of the "amortization" principle has led to added improvement in its accuracy.

The two systems are opposed in certain basic considerations, yet when correctly applied give remarkably close results. Both assume partial cutting, but horizontal cut assumes that all the cut will be taken from the largest trees, while the amortization principle assumes that the cut will be equally distributed over all size classes, hence more truly "selection" in nature. Horizontal cut is essentially a simple interest process, while "amortization" cut is a compound interest process. However, since the first is based on the condition at the mid-point of the cycle, an effect is obtained equal to the Pressler growth percent, which is a simple percent, but within prescribed limits closely approximates compound percent.

The use of compound interest in growth predictions has been debated from time to time, the proponents holding that since the forest actually lays on growth over original volume plus previously accumulated growth, the compound principle is actually followed. Possibly a stronger argument is that if the compound theory is used, then the process of summation is greatly simplified by the use of the various rental or annuity formulas. In addition, the use of such a growth rate is easily understood by the business men, whose interest in forest production is to be stimulated. This is well evidenced by a quotation from a letter which the author received recently from an industrial forester to the effect: "I might explain that I find it much better to express growth in compound increment percent than in any other way when dealing with corporation officers. They appreciate the significance of compound increment fully as well as compound interest and readily understand the effect of too rapid withdrawal of forest capital as well as they appreciate the significance of declining financial capital. Regulation of cut formulae are difficult to explain and sell."

Before going into the calculations

[1] Meyer, W. H. Amortization in stand growth and depletion problems. Jour. Forestry 41:920-922. 1943.

[2] Meyer, W. H. Predicting the effect of the heaviness of cut on growing stock. Jour. Forestry 44:1092-1094. 1946.

[3] Chapman, H. H. Forest management. Hildreth Press, Bristol, Conn. 1950.

a modification in the "amortization" formula is proposed. In its original form it was given as:

$$V_n = V_o(1+g)^n - \frac{C}{g}[(1+g)^n - 1]$$

where V_o is the present volume, V_n the volume at the end of the period, g the compound growth rate and C the annual cut. The name "amortization" formula was attached to it, because this very same formula can be used to show the amount at n years of an amortizing principle which bears a specified rate of interest and is gradually retired by an annual payment, that goes first to paying the interest on the net principal as of that year, and then to reducing, or amortizing, the principal still further. The formula was revised in 1946 to take into account the fact that in logging operations, the cut is taken out throughout the course of the entire year, instead of being harvested in mass on the last day as is implicit in the financial amortization principle. Attention here will be directed to the first form of the equation only.

The original formula is valid when the growth rate g is confined to that of the merchantable stand and does not include ingrowth. Should ingrowth be included, the final volume V_n will be underestimated. Two methods, here newly proposed, are available to take ingrowth into account, both yielding the same answer. From this point on, a change in symbols will be used. The term g_m will indicate the compound growth rate for the merchantable stand alone, and g_t will be that of the entire stand, including ingrowth. The first proposed change is:

$$V_n = V_o(1+g_t)^n - \frac{C}{g_m}[(1+g_m)^n - 1]$$

In this expression the terms $(1 + g_t)^n$ and $(1 + g_m)^n$ are obviously the 10-year growth factors, as previously determined 1.591 and 1.4269 respectively, and g_t and g_m the respective annual growth rates of 4.75 and 3.65 percent. In the right-hand part of the equation, the first quantity shows the development of the stand if left uncut and the second term shows the cumulative effect of the cut in a "sinking fund" fashion.

The second proposal consists of using the original formula as it stands with the lone exception of substituting g_m for g wherever it occurs and then adding as a final step the actual amount of the ingrowth as computed in Table 1. Examples of both these proposals will now be given. Later the results will be checked against that obtained by using the horizontal cut principle.

The total area is assumed to be 50,000 acres, holding 5,500 board feet per acre or a total of 275,000 M board feet. Several sizes of annual cut are inserted into the formula, together with the determined growth rates, and the final volume determined. For example with an assumed cut of 10,000 M board feet a year, the calculation according to the first proposal is:

$$V_n = 275{,}000\text{M} \times 1.0475^{10} - \frac{10{,}000\text{M}}{.0365} \times (1.0365^{10} - 1)$$
$$= 275{,}000\text{M} \times 1.5911 - \frac{10{,}000\text{M}}{.0365} \times .4269$$
$$= 437{,}635\text{M} - 116{,}959\text{M} = 320{,}676\text{M}$$

For this cutting budget, the stand will increase in volume by 16.6 percent.

The calculation by the second proposal is:

$$V_n = 275{,}000\text{M} \times 1.0365^{10} - \frac{10{,}000\text{M}}{.0365}(1.0365^{10} - 1) + \text{Ingrowth}$$
$$= 275{,}000\text{M} \times 1.4269 - 116{,}959\text{M} + \frac{903 \times 50{,}000 \text{ acres}}{}$$
$$= 392{,}398\text{M} - 116{,}959\text{M} + 45{,}150\text{M} = 320{,}689\text{M}$$

The two answers are alike, making provision for inaccuracy due to decimal places.

Similar calculations with other assumed annual cuts lead to the following summary tabulation:

Assumed annual cut	Predicted volume 10 years hence	Percentage gain
5,000M	379,046M	37.83
10,000M	320,676M	16.61
15,000M	262,087M	—4.70

At somewhat less than 15,000M ft cut per year, the forest will remain in balance. Any cut over this amount will deplete the growing stock. A decision can now be made on an annual cut which will compromise the needs of the production plant with the requirements for building up the growing stock.

The formula can be transformed to isolate the cut to the left-hand side of the equation, as follows:

$$C = g_m \frac{V_o(1+g_t)^n - V_n}{(1+g_m)^n - 1}$$

in which form, some slight advantage may be obtained in computing the annual cut.

Method of Horizontal Cut

To calculate an annual cut by this system, the stand table as of 5 years hence must be used, since it represents the average stand condition for the decade. The growth calculation form of Table 1 is followed, but for the shorter term. Half the diameter growth rates and half the mortality rates must be used. One additional column, that of cumulated volumes, is needed.

Under the theory of horizontal cut, a diameter limit as of one-half the cutting cycle (here 5 years) is determined which will give the desired annual cut, and this diameter limit is then accepted as a guide for marking throughout the cycle from the present year on to the last. In each year the trees currently above the diameter limit on the annual cutting area are removed. Thus trees may be cut in the last year of the cycle, which at the beginning of the cycle will be below the diameter limit to the extent of a diameter growth for the full cycle. Strict adherence to a diameter limit in the improvement-selection method of cutting is, of course, nonsense; in actual practice the determined limit is used merely as a guide. At the discretion of the marker and forester, trees below the limit may be selected for cut, and trees above may be left, just so long as a relative balance in volume is maintained.

The determination of the cut and its effect on volume at the end of the cutting cycle is a somewhat more complicated process than that for the amortization formula. For illustration, an annual cut of 10,000M feet will be assumed equal to an annual removal of 200 board

feet per acre for the forest as a whole. For the acre being harvested this in turn means a cut of 2,000 feet, since the acre is cut only once every 10 years. The cumulative volume in the last column of Table 2 shows that 2,000 feet occurs between 20 and 22 inches, nearer to the first. A determination of the exact diameter limit is now made as follows:

Diameter class	Lower limit of diam. class	Cumulated volume to lower limit	Interpolated exact diam. limit for 2,000 ft.
20 in.	19.0 in.	2394 bd. ft.	$19.0 + \frac{2394 - 2000}{2394 - 1343} = 19.38$ in.
22 in.	21.0 in.	1343 bd. ft.	

By adhering to an exact minimum of 19.38 inches in each year of the cycle, an average cut of 200 feet per acre, or an average annual cut of 10,000M feet will be obtained. The same objective will be obtained by introducing plus and minus flexibility in the diameter limit to permit rational silvicultural treatment.

The volume on the average acre at the end of the cutting cycle must now be found. The first step is to identify in the stand table as of 5 years hence exactly which trees will be cut and which left, then trace these back to the initial stand table, and finally project the reduced stand to 10 years hence. The diameter limit of 19.38 inches will leave $\frac{.38}{2.00}$ of the trees in the 20-inch class as of 5 years hence, or $.19 \times 2.92 = .55$ trees. From Table 2, it can be judged that these residual .55 trees have risen from the original 18-inch class. If added to the 1.30 trees stationary in the 18-inch class, this gives a total of 1.85 trees of the original 18-inch class remaining uncut. Table 2 is now condensed to include the residual stand only and a calculation precisely like that of Table 1 made to find the volume 10 years hence on the average acre. Table 3 illustrates the reduced calculation.

The number of trees in the 18-inch class is placed in parentheses in Table 3 to call attention to the fact that it already contains an allowance of 5 years mortality and needs correction for only 5 years more. The total predicted volume

TABLE 3.—CALCULATION OF VOLUME 10 YEARS HENCE ON THE AVERAGE ACRE, AFTER AN ANNUAL CUT OF 10,000 M BOARD FEET FOR THE FOREST

			Stand 10 years hence				
D.b.h.	No. trees	Volume per tree	Reduced for mortality	Rising 1 cl.	Rising 2 cl.	Total	Volume per acre
10	9.68		9.29				
12	10.50	90	10.11	7.80		7.80	702
14	7.69	135	7.42	7.38	1.49	8.87	1,197
16	5.45	200	5.27	5.16	2.73	7.89	1,578
18	(1.85)	275	1.82	2.74	2.26	6.00	1,650
20		360		1.36	1.53	2.89	1,040
22		445			.46	.46	205
						Total	6,372

on the forest of 50,000 acres is therefore 318,600 M board feet as compared to the 320,676M feet as obtained by the amortization formula. There can be no quarrel with the slight difference between the two answers.

Allocation of Annual Cutting Areas

A suitable annual cut has now been determined, say 10,000 M feet. The next step is to block out the working circle of 50,000 acres into annual cuttings areas in a logical sequence from one end of the working circle to the other, each area furnishing the required annual cut when it is reached. For preliminary allocation, two assumptions will be made, namely that the determined growth rates will apply to all parts of the tract and that the same percentage of cut will apply to all stand volumes per acre. The second assumption is not at all unreasonable, since it has been found on a large managed tract of southern pine that this is true except for the very light volume stands. The first assumption is less valid, but is necessary at this point. If growth rates should vary from one area to another, necessary adjustments can be introduced after the preliminary allocation is made.

The first annual cutting area should be credited with ½ year's growth, the second with 1½ years' growth, and so forth. The sum total of the volumes on the cutting areas at the time of cut, discounted to the present must equal the present volume. The analogy of this case to that of the present worth of a finite series of annual rentals in forest valuation is obvious and the finance formula can be easily restated in terms of forest growth, as follows:

$$V_o = \frac{V_{ca}}{g_c} \frac{(1+g_c)^n - 1}{(1+g_c)^n} \left(1 + \frac{g_c}{2}\right)$$

where the new term V_{ca} equals the volume on an annual cutting area when it is reached by the loggers. The last term in parentheses adjusts the calculation to a mid-year basis. It may be an undue refinement.

Applied to the case in question, the calculation is as follows:

$$275{,}000M = \frac{V_{ca}}{.0475} \frac{1.0475^{10} - 1}{1.0475^{10}} 1.02375$$

$$= V_{ca}\, 8.0069$$

$$V_{ca} = 34{,}345 \text{ M bd. ft.}$$

The final step is to discount the volume on the annual cutting area at the time of cut, 34,345M feet, by ½ year, 1½ years, 2½ years, etc. successively, which values in turn will be the present volume equivalents on the future cutting areas.

TABLE 4.—CALCULATION OF PRESENT VOLUMES ON ANNUAL CUTTING AREA

Annual cutting area	Present volume, corresponding to 34,345M at time of cut
First	$34{,}345/\ 1.0475^{1/2} = 33{,}557M$
Second	$34{,}345/\ 1.0475^{3/2} = 32{,}029M$
Third	$34{,}345/\ 1.0475^{5/2} = 30{,}578M$
Fourth	$34{,}345/\ 1.0475^{7/2} = 29{,}188M$
Fifth	$34{,}345/\ 1.0475^{9/2} = 27{,}866M$
Sixth	$34{,}345/\ 1.0475^{11/2} = 26{,}604M$
Seventh	$34{,}345/\ 1.0475^{13/2} = 25{,}394M$
Eighth	$34{,}345/\ 1.0475^{15/2} = 23{,}241M$
Ninth	$34{,}345/\ 1.0475^{17/2} = 23{,}143M$
Tenth	$34{,}345/\ 1.0475^{19/2} = 22{,}094M$
	Check sum 274,714M

With these volumes calculated, the annual cutting areas are

blocked out on the inventory map, by ticking off the 40 volumes until they total the volume indicated for the first year of cut; then starting afresh for the second year of cut, and so on. Area control, or equality of size in the annual cutting area is thus subordinated. This will be approached gradually in subsequent cycles with the continued development of the forest growing stock. A closer approach to equality in the first cycle will be obtained if those major areas of the working circle bearing the heaviest stands are chosen for the starting point and the lightest areas for the final years. A logical sequence of cutting areas can be arranged easily so that the cutting at the beginning of the cycle starts at one end of the working circle and subsequent areas flow smoothly through the circle to the other end by the termination of the cycle.

At the end of the cycle, a new inventory is made, new growth rates are computed, assessment is made of the new conditions, and the regulation of cut repeated. Eventually when stocking and age of the forest has attained the desired goal, the size of the annual cut can be determined by longer periods and possibly even by rotations.

Epicormic Branching on Pruned White Fir

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EPICORMIC BRANCHES have developed on white fir (*Abies concolor* (Gord & Glend.) Hoopes) one to two years after part of the live limbs were removed in a pruning experiment. The appearance of an average of six epicormic sprouts per tree raises some doubt as to the desirability of pruning this species.

Although epicormic branches are common on many tree species, the causes of sprouting are not clear. The sprouts develop from both dormant and adventitious buds. Exposure to light after thinning appears to stimulate sprout formation in some species, such as yellow-poplar.[1] On the other hand, sprouts commonly called "agony branches" develop on birch as a result of shading.[2] Sprouts are also common on injured white fir, especially where part of the crown has been lost and the bole raked by the falling of other trees. In such cases the branches appear as a feathery growth on the part of the tree where the crown was lost. Although not so obvious, a few epicormic branches are found on undamaged fir both in cut and uncut areas. Here the sprouts are generally less vigorous and often die.

Data for this study of epicormic branching were collected from two experimental plots. Both are located near Pinecrest on the Stanislaus National Forest in central California. On Plot A, 28 white fir were pruned as a part of a pathological study by Dr. W. W. Wagener and his associates of the Bureau of Plant Industry, San Francisco, Calif. The stand had been selectively logged in 1947 when approximately one-half the volume was removed. The area is of a medium site and the forest type is predominantly white and red fir with a few scattered sugar and Jeffrey pines. Diameter, crown classification, and number and position of live branches cut were recorded for each tree.

On Plot B, 50 white fir were pruned in June 1950, shortly after the commencement of the growing season. These trees were in an understocked stand of fir on land of a high site quality. The area had been logged of all merchantable trees in 1926. Borings showed that all trees pruned had been present as advance growth at the time of logging and that growth had not shown appreciable acceleration until the trees had overtopped the intermingled brush some 5 to 15 years later. Diameter, crown classification, percent of length of live crown removed, and portion of bole exposed to sunlight were recorded.

FIG. 1.—Epicormic branches in a pruned white fir. One-third of the green limbs had been removed by pruning 15 months before this photograph was taken.

An examination of the plots in September 1951 disclosed that most of the pruned trees on both areas had acquired a number of epicor-

[1] Wahlenberg, W. G. Epicormic branching of young yellow-poplar. Jour. Forestry 48:417-419. 1950.

[2] Büsgen, M. The structure and life of forest trees. Ed. rev. and enlarged by E. Münch. English translation by T. Thomson. John Wiley & Sons, Inc., New York. 1931.

mic branches (Table 1). An analysis of data from this study indicates some of the factors affecting sprout formation.

A regression analysis was made for each plot, comparing the number of sprouts per tree with growth rate, tree size, and amount of live crown removed. These factors explained only 28 percent of the variation on Plot A and 13 percent of the variation on Plot B. However, observations on unpruned trees in Plot B leave no doubt that most of the sprouts have developed as a result of pruning. It is probable that more of the variation would be explained if the plot contained trees with a smaller portion of the crown removed.

The number and position of quadrants of the pruned bole exposed to skylight were recorded on Plot B. Analysis showed that only exposure of the bole to direct sunlight, i.e., east, south, and west quadrants, had an apparent effect on the number of sprouts. Exposure of the north quadrant to skylight had no apparent effect. Trees with two or three sides (disregarding north) of the pruned bole exposed to direct sunlight had an average of 7.22 sprouts per tree, while those with one or no sides exposed had only 2.46 sprouts per tree. This was a highly significant difference as determined by the "t test." Although the number of sprouts per tree was influenced by the number of quadrants exposed to direct sunlight, there was no apparent relationship between sprout location and quadrant exposed.

These analyses give definite indications that high incidence of epicormic branching is associated with the following conditions:

1. Exposure of a large portion of the bole to sunlight as a result of pruning.
2. Small diameter of the tree at the time of pruning.
3. Rapid growth rate of the tree.
4. Removal of a large portion of the green crown.

Observations of epicormic branches on injured white fir indicate that some if not all of the sprouts will persist and grow.

TABLE 1.—DESCRIPTIVE DATA ON PRUNED WHITE FIR TREES

Item	Plot A	Plot B
Year area logged	1947	1926
Date pruned	November 1949	June 1950
Number of trees pruned	28	50
Diameter breast height when pruned	14.5 inches average (Range: 9.0-21.9)	9.2 inches average (Range: 3.8-14.9)
Diameter growth — time of pruning until September 1951	0.48 inch average (Range .2-.8)	0.70 inch average (Range .3-1.1)
Percentage of length of live crown removed	(Not recorded)	33 average (Range: 20-40)
Number of live limbs removed	11 average (Range: 2-31)	(Not recorded)
Number of pruned trees with no epicormic branches	6	5
Number of epicormic branches per tree	6 average (Range: 0-26)	6 average (Range: 0-25)

Whether more will develop on white fir if the first ones are removed is not known at his time, but observations on other sprouting species indicate that new sprouts may appear.

Epicormic branches are a serious obstacle to the production of clear lumber or peeler bolts from white fir. The species is tolerant and a notably slow natural pruner, and to defer pruning until all the branches on the prunable portion of the bole are dead would probably be uneconomical. From evidence on the plots studied, sprouts may appear on any tree from which live limbs are removed in pruning.

By proper selection of the trees to prune, it may be possible to keep the number of sprouts at an allowable level. This study indicated several conditions that influenced the number of sprouts, including the size and growth rate of trees. Pruning larger, slower growing trees, however, will not yield enough clear wood to be profitable. Therefore, until a practical method of controlling sprouts is found, either by selecting trees for pruning or by subsequent removal of the sprouts, any money available for pruning may well be more profitably spent on species that do not form epicormic branches when pruned.

Journal of Forestry Subscription Rates Increased

Effective with the January 1950 issue of the JOURNAL OF FORESTRY format was changed, allowing more material to be printed in a volume and increasing the service generally to readers. An increase in subscription rates was not made at that time. However, in view of the additional service to JOURNAL readers and increased editorial, clerical, and printing costs, annual subscription rate of the JOURNAL OF FORESTRY will be increased to $7.50 annually, effective January 1953. (Additional postage, foreign $1; Canadian, 50 cents.)

Current rate of $6 annually will apply for renewal subscriptions expiring prior to December 31. Renewals and new subscriptions starting January 1953 will be billed at the new rate of $7.50 annually.

Notes

Get A Rope

The JOURNAL OF FORESTRY contains many an article or note describing an instrument or technique that some one has found beneficial in increasing his efficiency and his accuracy of observation. Quite often a rather simple dodge can save much time and effort. Here is one ridiculously simple aid that the author has found quite useful and which probably deserves consideration. After boring thousands of trees over the course of many years in many kinds of weather, with instruments in all shapes and conditions and with trees of varying hardness, he has often had occasion to condole with himself because the tree was frozen, the borer dull, or the tree impervious, with the result that he accumulated a set of sore palms, aching shoulder muscles, frayed nerves and, to top it all, a collection of poor increment cores. This experience has undoubtedly been shared by many others. After one annoying day, he finally sat down and applied his brains to the job. The following brainstorm emerged, was tried out immediately and proved eminently successful. For the last three years, new groups of students were taught the method and all gave it unanimous approval. Have you ever tried to use an old borer where the cutting edge of the bit was worn down to the flanges? Have you tried to use the borers that came out shortly after the end of the War with bit bevels poorly designed? Have you tried to bore small, dense trees which wave around when you try to drive in the bit? Have you tackled trees with horny latewood in the early spring? If so you will be interested.

The solution is to get a piece of tough rope, preferably sash cord of about one-quarter inch diameter and seven or more feet long, depending upon the size of the trees that will be bored. The increment borer is inserted through the bark of the tree in the desired position. The rope is passed back around the tree and the two ends brought together over the handle of the borer and knotted together in a single or double bow knot. The fit should be fairly tight. The borer is then rotated without application of pressure but with special effort on keeping it running true without wobbling. The rope cinches up on the shaft of the borer and within short order produces a great pressure of borer against the tree. As soon as the operator feels that the bit has sunk into the wood, he releases the bow knot and proceeds with his boring as usual. In hard-to-bore trees, from whatever cause, the output per day can easily be doubled with much less fatigue. There's only one drawback to the procedure, namely that it is hard on the rope, with the result that one must be prepared to knot together the pieces and have sufficient extra length.

WALTER H. MEYER

Oak Wilt Mortality in an Unmanaged Iowa Forest

The oak wilt (*Chalara quercina*, Henry) is a destructive disease of oaks in Iowa and in other parts of the upper Mississippi Valley. Although the infection has been present for many years, the fungus causing the disease was not identified until 1942. All species of oak native to this region are susceptible and recovery after infection is rare. Because the entire tree is killed there is no regeneration by sprouting.

The first victims often are the larger, more dominant individuals in the stand. On northern red (*Quercus borealis* Michx. var. *maxima* [Marsh.] Ashe), black (*Q. velutina* Lam), and Jack (*Q. ellipsoidalis*, E. J. Hill) oaks the fungus develops very rapidly, usually killing the tree within 30 to 60 days after wilt symptoms are apparent. The white oak (*Q. alba* L.) is somewhat more resistant. It may survive for several years after infection, as only a few branches are usually killed each year.[1]

It is believed that all means of transmitting the disease organism have not been discovered; and for this reason, no positive control methods have been developed. Various forms of sanitation seem to offer the most promising results. One method which appears to have been successful in some cases is the removal and destruction of infected trees and removal of all other oaks within 100 feet of them. This is based upon the current belief that the development of localized groups of diseased trees is by transmission through root grafts from an initial infection. Further development in methods to prevent continued spread of the fungus must await discovery of how initial infections occur which are distant from an infection source.

To obtain information on the extent of mortality in a natural stand, a 100 percent inventory was made in 1951 of the trees killed by oak wilt on 38.6 acres of the Iowa State College Brayton Memorial Forest in Delaware County, Iowa. The oak wilt disease has been active in the stand for many years, but since the tract was unmanaged prior to its recent acquisition by the college the time when the original infection occurred is not known.

Using the narrow growth rings produced during, and associated with, the severe drought years of 1934 and 1936 as a basis for dating purposes, examination showed that the dead northern red oak loses its bark early and remains standing for a maximum of 7 or 8 years after death. Infected Jack and black oaks, on the other hand, generally retain their bark, decay rapidly, and fall within 5 or 6 years.

This difference in rate of decay

[1]Dietz, S. M. and Roy A. Young. Oak wilt a serious disease in Iowa. Iowa Agricultural Expt. Station Bulletin P91. 1948.

is important in that the heartwood of dead northern red oak remains sound enough for 6 to 10 years to use for ties or low-grade lumber, while the black and Jack oaks generally are useless within a few years. Prompt salvage must be made of the latter two species if they are to be sold even for tie logs.

In this study, only standing dead or dying trees infected with the disease were tallied. As nearly as could be determined, these trees had become infected and died during the preceding 8 years. The data obtained in this study are presented on this basis. Inasmuch as rapidly decaying Jack and black oaks make up a high proportion of the stand, the estimates are conservative.

Stand description.—The present even-aged forest resulted from a clear-cutting operation about 80 years ago. At the time of inventory in 1952, there were 117.7 trees per acre 4.6 inches or over in diameter at breast height. Over 75 percent of these trees were white, northern red, black, or Jack oaks, with about as many white oaks as all other oaks combined. These species comprised 89.4 percent of all trees of sawlog size, i.e., over 10.5" d.b.h. Depending on the site quality, the growth rate varied from 150 to 350 board feet per acre per year and averaged about 250 board feet for the stand.

Oak wilt losses.—Nearly all the trees killed by oak wilt were northern red, Jack, and black oaks. Using the total number of standing oak trees (both dead and living) as a base, the oak wilt losses over the 8 year period were 11.3 percent of the northern red oak and 13.5 percent of the Jack and black oaks combined. Only 0.4 percent of the white oak trees were killed by oak wilt.

Seventy percent of the sawlog-size trees in the stand were red, Jack, and black oaks. The disease was most active in the trees over 10.5" d.b.h. (Table 1). Mortality in these larger sizes averaged five trees per acre as compared with less than one per acre for the smaller trees. There were 52 trees of sawlog size and 56 trees of pole size per acre in the combined dead and living stand. Thus, during the last 8 years, the mortality caused by oak wilt represented a decrease of nearly 10 percent for sawlog sizes and 1.5 percent for the smaller trees.

TABLE 1.—EXTENT OF OAK WILT DAMAGE ON A 38.6 ACRE IOWA WOODLAND FOR AN 8 YEAR PERIOD, BY SPECIES AND SIZE CLASSES

Losses per acre caused by oak wilt	Species		
	Red oak	Jack and black oak	White oak
For trees 4.6" to 10.6" d.b.h.:			
Number of trees killed	0.44	0.36	0.05
Volume affected, cubic feet	2.43	2.24	0.17
For trees 10.6" d.b.h. and larger:			
Number of trees killed	2.90	1.99	0.15
Volume affected, board feet[1]	637.5	275.8	17.6
Total number of trees killed	3.34	2.35	0.20

[1]International ¼" rule.

In terms of merchantable volume, the mortality in the trees of sawlog size represented a loss of 931 board feet per acre in 8 years. This was equivalent to 10.1 percent of the average living gross volume. During this short period, the loss per acre due to oak wilt was comparable to the death of 5 trees 16 inches d.b.h., each having 32 feet of merchantable height.

Although the volume lost in trees under sawlog size was not great, it represented 2.3 percent of the total volume in these diameter classes. The loss averaged 4.84 cubic feet per acre which was roughly equivalent to 29 board feet in 8 years. Three-fourths of these smaller dead trees, moreover, were in the 9 and 10 inch diameter classes which were needed for ingrowth to maintain good diameter class distribution and growing stock.

Combining sawlog volume with that in the smaller trees, the total annual loss from oak wilt averaged 121 board feet per acre. This is equal to 48.4 percent of the current gross annual growth rate of 250 board feet per acre. In this particular stand, then, the oak wilt disease has made serious inroads on stand yield. Similar conditions exist in many other oak forests of of eastern Iowa.

The unpredictable death of the larger, faster-growing oaks and the need for salvaging such trees before they become a total loss present new problems in the successful management of oak forests of this region. Favoring other local species or introducing new ones, making rather frequent harvest or salvage cuttings, and adopting any practical control measures for oak wilt that may be developed are suggested methods of keeping the forests productive in spite of the disease.

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Contents and Title Page Bound in Journal

Table of Contents and Title Page for Volume 50 will be found in the back of this issue. For binding purposes the complete section can be removed by opening the staples.

The Lost Identity of Doyle and Scribner

Who was Edward Doyle, and who was J. M. Scribner? As authors of two formulas for measuring the broad foot content of logs, their names are familiar to all who deal with forests and lumber. Possibly no American log rules have been more widely used or more vigorously criticized. But who were the men whose names, for more than a century, have been connected with them?

Were they mill owners, loggers, bookkeepers? Self-made or college educated? Short, fat, or lean? Were they family men, and if so, what is known of their descendents?

Scribner's Ready Reckoner and Log Book, for Ship Builders, Boat Builders, and Lumber Mechanics was first published by George W. Fisher of Rochester, N. Y. in 1846. It was printed from plates "sterrotyped" by Richard H. Hobbs of Hartford, Conn. The earliest edition in the Library of Congress was "revised and improved" in 1870. Battered and yellowed with age, this little book of seventy-two pages has a paperboard cover of approximately three by five inches. It contains fifteen tables, of which Table VII, entitled "Logs reduced to inch measure," corresponds with the Scribner Log Rule in Austin Cary's *Manual for Northern Woodsmen*. Four pages are required for this table, and the board foot contents are given for logs ranging in length from 10 to 25 feet, and in diameter from 12 to 44 inches.

J. M. Scribner, A.M., is credited as author, and also as having written *Engineers and Mechanics' Companion, Practical Mensuration, Engineer's Pocket Table Book*, and others. From this it may be deducted that Mr. Scribner was an engineer and something of a mathematician. He may have been a teacher. Apparently he was a resident of Erie County, N. Y., and possibly of Buffalo. This last is indicated by the printed recommendations of two Buffalo residents: Sylvester Brown — sawyer and lumber dealer, and L. A. Burrows. January, 1846, when these testimonials were dated, corresponds with the year when *The Ready Reckoner* was first "entered according to Act of Congress . . . in the Clerk's Office of the District Court of the Northern District of New York." This preceded by twenty-four years the allocation of copyright responsibilities to the Library of Congress, so the records of that period are sketchy.

Concerning Edward Doyle, even less was found, and no copy of his book of log rules is in the Library of Congress. It is safe, however, to assume that he may have preceded, or been contemporary with J. M. Scribner, but nothing is known as to their relations or even if they were acquainted. That they dealt with the same publisher is indicated in the following statement by George W. Fisher, which appears opposite the preface of the 1872 edition of *Scribner's Lumber & Log Book:*

> "Note. — I have for several years owned the copyright and stereotype plates of Doyle's Ready-Reckoner, a similar book to Scribner's, but have discontinued its publication.
>
> "Any infringement of the copyright of either Scribner's or Doyle's book will be prosecuted to the full extent of the law.
>
> Rochester, N. Y. 1872."

Additional confirmation is in a letter dated February 1872, signed by G. W. and C. T. Crouch, "Manufacturers & Dealers in all kinds of LUMBER, LATH & SHINGLES," Rochester, N. Y., and included in the 1872 edition. It states: "We have used Mr. Doyle's calculations for measuring logs for many years, and consider them the most reliable now in use, and in fact the only tables that give fair measurement for buyer and seller of logs."

This completes all that has been found concerning Edward Doyle.

The copyright date of *The Ready Reckoner*, the address of the publisher, and the locations of the signers of the several testimonials all indicate that the operations of Doyle and Scribner were each in western New York. It is also possible that they were influenced by the opening of the Grand Canal, now known as the Erie Canal.

This early project of the State of New York to provide a channel for public transportation was completed in 1825. It started Buffalo, the neighboring Tonawandas, and Albany on coordinated careers of increasing importance as distributing centers for lumber. Small sailing craft brought white pine lumber across Lake Erie from the Canadian shore. Hardwood logs, as well as lumber, were carried in similar ships from the south shore of the lake. Buffalo, being at the western terminus of the canal, was a transfer point. It became a gateway for the entrance of lumber into the Empire State. By the early 1850's Buffalo's lumber trade from the lake may have been as much as 100 million board feet a year, and a considerable number of lumbermen were engaged in the local trade.

Meanwhile, the loggers and mills were pushing westward into Michigan, and beyond, so that Doyle and Scribner may be credited with having anticipated a growing demand for tabulated formulas which would give quick and satisfactorily accurate measures of the board foot contents of logs. How well they profited by their foresight is not known, but even at the modest price of 35 cents a copy the returns from sales of the succeeding editions of *Scribner's Ready Reckoner*, and *Scribner's Lumber & Log Book* could have been attractive. The edition of 1870 reported the sale of over 450,000 copies, while that of 1882 boasts that nearly a million copies had been sold "in the United States and Canada and orders have been received from Novia Scotia, Australia, South America, England, and Germany."

The Doyle rule may have been developed first, but for some twenty-five years after 1846, Scribner's was in the ascendency. A switch to the Doyle rule was reflected by publisher Fisher in the

edition of 1872. Having held the copyright to both rules, he reports that until 1872 he had used Scribner's rule almost to the exclusion of Doyle's. In that year he made the following announcement:

> "Doyle's rule for measuring saw logs has been substituted for Scribner's and the whole book has been carefully examined by Daniel Marsh."

No further reference is made concerning Daniel Marsh, but apparently on his authority Scribner's rule is described as "mathematically correct, yet when *practically tested*, the results did not in all cases hold good, particularly when logs were not *straight* as nine-tenths of them are not."

The publisher's statement went on to say: "This gave rise to much dispute between buyer and seller, and we found the larger classes of log buyers and lumber men often refused to adopt the measurement given in the tables of former editions, claiming that Scribner did not allow enough for slab, nor for saw kerf, two very important items where logs are bought for sawing into boards.

"Hence," continued the publisher, "after repeated correspondence and consultation with large lumber dealers and practical sawyers in various parts of the country, we have become satisfied that the calculations given in this table are universally used by dealers for all sizes of logs, and are considered the only fair measurement for both buyer and seller. We shall hereafter adopt them for this book, trusting they may prove acceptable to all parties."

The sales appear to have held up, and possibly to have increased, as a result of the change.

Publication of *Scribner's Lumber & Log Book* was taken over by S. E. Fisher, also of Rochester, in 1895, and appears to have ceased after 1897. A search through the books and publications in the Library of Congress uncovered no reference, other than in the several log rule books, of Rochester printers or publishers Geo. W. Fisher or S. E. Fisher. More important to this quest, however, is the fact that no more concerning Mr. Doyle and Mr. Scribner was found than is contained in this article. So the question is repeated: Who was Edward Doyle, and who was J. M. Scribner?

HARRIS COLLINGWOOD,
Library of Congress.

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A Study of the Needle Cast Diseases of Conifers in Pennsylvania[1]

A study of the needle cast fungi of conifers in Pennsylvania was conducted from July 1951 to July 1952. The study was developed with the Christmas tree industry of the state in mind to determine the common species of needle cast fungi, their respective hosts, and their distribution and damage in representative areas of Pennsylvania.

Four needle cast fungi of conifers are common associates of pine plantations and natural stands in Pennsylvania. *Bifusella linearis* and *Hypoderma desmazierii* are mildly parasitic on white pine but their damage is negligible. *Lophodermium pinastri* is the most widespread of the needle cast fungi in Pennsylvania occurring on the dead, fallen needles of all the common pine Christmas tree species. Field observations and pathogenicity tests present reasonable evidence that this fungus is saprophytic in nature. *Hypoderma lethale* is the most virulent of the four common needle cast fungi, but Christmas tree species are not threatened by this fungus since its attack is confined to native hard pines in Pennsylvania. Widespread defoliation and growth reduction caused by *H. lethale* in pitch pine plantations and natural stands is an example of needle cast damage in epidemic proportions. All pitch pine trees examined were infected, with heavy infection in from 10 to 30 percent of the total stand on areas studied.

Rhabdocline needle cast of Douglas-fir was discovered for the first time in Pennsylvania during the course of this study. The virulence expressed by this fungus and the proximity of the heavily infected area (40 percent of the total stand) to a large planting of Douglas-fir Christmas trees necessitated chemical spray control measures.

Needle cast epidemics were found to be closely allied with a combination of factors. Two of the most important seem to be climatic periods of high humidity and hosts of poor vigor which exhibited weakened conditions.

Defoliation and reduction in grade resulting from the white pine blight seems to be more prevalent in white pine Christmas tree plantations than damage caused by needle cast attack. Maximum blight intensity was noted on trees which were growing in exposed openings within the plantations examined. Combined results from several plantations showed that on per acre basis, 50 pines were in an advanced blight condition, 304 were intermediately chlorotic, and 186 were healthy.

WILLIAM J. STAMBAUGH,
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Department of Forestry,
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[1]Abstract of a thesis presented for M.S. degree in forestry, The Pennsylvania State College, 1952.

Reviews

Forestry and Its Career Opportunities.

By Hardy L. Shirley. 492 pp. Illus. McGraw-Hill Book Co. New York 36, N. Y. 1952. $6.50.

The nature of the human intellect is such that many of us go through life seldom comprehending subjects in their entirety, concerning ourselves with individual parts which are of special interest to us or which we take to be of special importance. One would expect this weakness to be no less true of foresters than of men with other interests. Indeed, because of the complexities, interrelationships, and ramifications of forest conservation, one might expect to find few individuals capable of cementing diversity into a conglomerate whole. Our profession may derive pride from the knowledge that we have, perhaps, more than our share of such men. One of these is Hardy L. Shirley, as a careful reading of *Forestry and Its Career Opportunities* will clearly demonstrate.

In this book, written for the information of the layman and the young prospective forester, the threads of forestry are woven into a whole cloth. The sources of forestry's problems, often obscured by greater issues of democracy or human conduct, are traced to their origin. The benefits to mankind which will accure from the work of the profession are brought forth clearly—both the obvious and direct and the secondary and resultant. Along with this is a surprisingly large amount of up-to-date statistics, ranging from the cost per acre of airplane spraying for the tussock moth to a diagrammed career ladder which would be climbed by an ambitious young forester in a pulp and paper company.

The writer states that forests are for use and that to use them man must protect them, care for them, harvest and process their products —whether these products be water, wildlife, timber, or human recreation. Following this theme, and with an adroit combination of generalities and detail, this book gives a telescopic view of world and U. S. forest history and present status together with microscopic examination of the various employment fields which come under the heading of professional forestry or closely related work.

With a view to orienting the would-be professional and informing the layman, the author does not fail to underline more than once the human-natural resource relationship which has created the necessity for all types of effort in the field of conservation and which now defines its problems. No student of economics or of resource use and preservation could fail to be struck by the insight and clarity of the author's observation that:

> Two great struggles characterize America: the struggle to occupy the land and use its resources and the struggle in the hearts of men to free the creative spirit of individualism while guiding it in the common interest. The first struggle was won with the passing of the frontier, the second will continue as long as we remain a free people.

In presenting his material for digestion by the reader the author proceeds from the general to the specific to the general. The subject matter could be divided into three classifications. The first deals briefly with the history and development (or lack of it) of forestry. The second covers at considerably greater length individual fields and types of work involved in the profession and closely allied callings. The third portion covers a wide variety of general topics, including world and national forest resources. As each subject is dealt with, the professional worker's tasks throughout his career are discussed. The approach is not cold and impersonal. Frequent glimpses are given the reader into the kind of life called for by different jobs. There is even a word of warning that the hardships which a forester and his family may sometimes be called upon to face are likely to be more disturbing to the wife than to her work-occupied husband. How a wife may rise above inconveniences and isolation to interpret her husband's work to herself and to her children in its true terms of public service, how appreciation of its unique possibilities for happiness can be developed—these remarks, though brief, may help young families to enjoy the place which a forester's life can give them. Their inclusion indicates the thoroughness with which the author has covered his field.

Definitely this book is a worthwhile addition to The American Forestry Series of McGraw-Hill. It will guide and inform the student and the neophyte forester. Read by laymen, it will do much to create a greater understanding of the significance and place of forestry in the world and in the national scene, past, present, and future. It is thoroughly suited to use as a source of general statistics regarding almost any aspect of forests, forest utilization, and forestry. Though quite a bit of technical information is conveyed, it is presented in nontechnical language.

Despite the fact that this book is not aimed at professional foresters, it will make a worthwhile addition to their libraries. For this reviewer it served to freshen memory about the nature of the work involved in forestry's divergent fields, together with facts about recent developments. It served, also, to revitalize the conviction that "forestry is important work" and that pursuance of our profession lends "a sense of inner satisfaction."

ARTHUR B. MEYER.

Forest Insects of the Southeast.

By James A. Beal with the assistance of William Haliburton and F. B. Knight. 168 pp. Illus. Duke University School of Forestry Bull. 14. Durham, N. C. 1952. $2.50.

As the title suggests, *Forest Insects of the Southeast* is primarily a handbook of the common forest insect species of the southeastern United States. Also included, however, are the general principles of forest entomology and the techniques of forest insect control.

The insect species treated are grouped and discussed according to the stage of tree growth they attack and according to the type of injury they produce. These divisions include eating insects, insects which attack young trees, insects which attack mature and other living trees, insects which attack dying and recently felled trees and logs, and finally, insects which attack forest products and wood after it has been placed in use.

One can readily see that this type of organization of the subject matter makes the book more easily used by the practicing forester and others who have little training in the more technical aspects of insect classification. Nevertheless, if the authors could have included field keys for further separating the species the book would have been even easier to use.

The discussions of general principals consider such subjects as the factors which affect the abundance of forest insects, methods for conducting forest insect surveys, and the economic importance of forest insects.

The book is well organized and clearly written. It is abundantly illustrated with good halftones which include more than 150 figures. These illustrate some of the insects which cause the damage, the injuries they cause, and methods of control. The bulletin has a general and a host index.

Dr. Beal is now chief of the Division of Forest Insect Investigations of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. He is well qualified to write this book, for part of his outstanding career as a forest entomologist was spent in the part of the country which this bulletin covers. It is a fine contribution to forest entomology and will be most useful to practicing foresters and others who are concerned with protecting the forests, especially for those in the southeastern part of the country.

R. F. ANDERSON,
Duke School of Forestry.

The Common Loon in Minnesota.

By Sigurd T. Olson and William H. Marshall. 77 pp. Illus. Quetico-Superior Foundation, 347 Madison Avenue, New York 17. 1952. $1.

Dr. Marshall and Mr. Olson use this bulletin to make a report on their observations concerning the habits and habitat of the common loon in Minnesota. Their field work was carried on during the summers of 1948-1949. The text offers evidence that this field work was considerably supplemented by a review of the literature related to this subject up to 1950. The bibliography connected with it is complete, and facts recorded by others are commonly interspersed in their text. In almost every phase of their observations the authors cite previous experiences by other observers, pointing out findings which are in agreement with or contrary to them.

In their study area, covering about sixty square miles, they had under observation approximately fifty-two pairs of birds. Their discussion of nesting habits is based on studies of 42 pairs. From these, egg measurements were made on 30 eggs and chick measurements on 15. Seventeen adults were measured and all these data conform pretty largely to the ranges or sizes given in many of the well-known works on ornithology.

In Minnesota, birds were found to constitute no economic problem; however, the authors cite examples in which the loons' destructive feeding habits were of economic importance to commercial fisheries in the Great Lakes. In the territory of the study the esthetic value of this species is the principal reason for interest in it. There was no evidence of any kind that it exerted any significant effect on fish population or any other natural resource. The living habits of the birds, as observed, are very thoroughly recorded and reported on.

The publication supplies additional documented information on this species which substantiates the findings of many other observers. Many of the facts in it could be substantiated in other areas where the loon occurs as a breeding bird and, for lack of more specific information, the wildlifer, forester, or ornithologist might find this a useful guide in appraising the importance of the bird and as a generalized account of its behavior and habits.

RICHARD M. MAY,
Soil Conservation Service.

Forest Resources. Vol. V of Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources.

325 pp. Illus. Department of Economic Affairs, United Nations, New York, N. Y. 1951. $3.

This tome of 325 two-column pages carries in full the seventy-six scientific papers prepared for the Forest Resources Section of the world conference at Lake Success, then the headquarters of United Nations, August 17-September 6, 1949.

The Forest Resources Section was one of the six in which the conference was organized. The others were Mineral Resources (Volume II of the Proceedings), Fuel and Energy Resources (Volume III), Water Resources (Volume IV), Land Resources (Volume VI), and Wildlife and Fish Resources (Volume VII). There were also some eighteen plenary sessions at which papers dealing with resources, problems, and solutions were given in full and discussed (Volume I). Several of these addresses dealt in whole or in part with forest resources.

A basic purpose of the conference was to bring to the attention of those planning the development of underdeveloped regions techniques in resource conservation and utilization available elsewhere

which, with appropriate adaptations for natural and economic conditions, would avoid mistakes and wasted time and effort. A purpose of the section meetings was to highlight particular techniques developed in different countries.

The papers for the Forest Resources Section were prepared by scientists and technicians of some twenty-seven nations. Their wide scope and the range of reader interest are indicated by the broad fields considered successively by the seven half-day sessions of this section: Forest Inventories, Protection of Forests (against fire, insects, and diseases), Forest Management, Protective Functions of Forests, Administration of Forests (including forest policy and law), Logging and Sawmill Techniques, and Preservation and Chemical Utilization of Wood. The publication is arranged in accordance with these subject matter fields, and the papers and authors are so listed.

Each session closed with a discussion. Summaries of these are included in the publication. The brief time available in the crowded programs and the absence of about half of the authors, which made it necessary for others to summarize their papers (section papers were not read in full), diminished the effectiveness of the discussions. Attendance and interest surely were affected adversely by the fact that this conference followed so closely the Third World Forestry Congress in Helsinki, Finland, in July.

Each broad subject was to be introduced by a paper dealing with principles and criteria of general applicability; this to be followed by "experience" papers for individual countries. The distinction is not always clear. Perhaps half are supplemented with biographies of varying national and international completeness. These will be useful. Naturally the caliber of the papers varies widely. Many, however, are scholarly, informative presentations. Time and space preclude detailed evaluation. Readers will be impressed anew with the difficulties of forestry and the lack of it in the tropics—teak forests excepted; and with the world-wide problem of closing the gap between technical know-how and its application.

Despite some limitations this compendium will be a useful addition to the fund of readily available scientific information regarding techniques in forest resource conservation and utilization. Some foresters will be interested in papers available in other volumes that deal with allied fields and with the integration of forest and other resources in regional and national development.

A few more words are in order about the conference as a whole. This was the first world conservation conference of its kind ever held. In the words of Trygve Lie, Secretary General of United Nations, it was to be "a first step by the United Nations toward mobilizing the science of the whole world to promote higher standards of living." It was participated in by over 700 formally designated individuals from fifty-one countries. These were members of governmental and private agencies, learned societies, universities, private consultants, etc. They participated as individuals rather than as delegates of countries or agencies. Some 550 papers were presented.

By direction of U.N.'s Economic and Social Council the conference was precluded from policy making. There were no resolutions from the conference as a whole or its sections. This limitation was doubtless related to the prominent position and responsibilities of U.N.'s Food and Agriculture Organization in respect to natural resources.

It may be of interest to recall that the idea of a world conference on natural resources goes back to the days of Theodore Roosevelt. Following the epoch-making Conference of State Governors (including representatives of the agencies and other experts concerned with natural resources) in 1908, steps were taken to hold such a world conference. Invitations had been accepted by thirty of the fifty-eight nations to whom they had been sent, but the plan failed to carry through owing to change in administration. Gifford Pinchot's vision of the conservation of natural resources as a foundation for permanent peace, which is vigorously advanced from time to time over the years, was a strong factor in President Truman's proposal to the United Nations which led to the conference in 1949—the fruition of effort that began more than forty years ago.

RAYMOND E. MARSH

Forest Practice Survey Report.

191 pp. Illus. Northeast Pulpwood Research Center, Gorham, N. H. 1952. $3.50.

Six years have elapsed since the U. S. Forest Service published its reappraisal of the forest situation in the United States. What has happened in the interim? Do conditions of lands cut over since this appraisal was completed in 1946 indicate improvement in the quality of cutting practices? What progress, if any, is being made?

This report is an attempt to answer these questions, at least as they relate to New England, New York, and Pennsylvania. It is the result of a forest-management appraisal project sponsored by the Northeast Pulpwood Research Center. To conduct this survey it obtained the services of H. H. Chapman, professor emeritus of forest management at Yale University, and William P. House of Chesham, N. H., a graduate forester and forest landowner.

In the opening paragraph of the report Chapman succinctly states the purpose of the study: ". . . to determine by field examination, checked by other sources of information, the status of current practices in the region, on lands belonging to all classes of private owners." He further states that it was not the purpose of the survey to question the accuracy of the findings of the U. S. Forest Service reappraisal; rather it was to determine whether conditions, portrayed by the Forest Service "held good, had been bettered, or were now worse." In addition the authors hoped to evaluate conditions which

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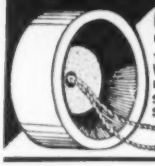

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either improve or deteriorate the situation and to indicate practical improvement measures.

Cutting standards adopted by the survey were essentially the same five grades used by the Forest Service reappraisal. Approved statistical methods of sampling were not followed in the survey. To quote the authors: ". . . we enlisted the aid and cooperation of all forestry agencies available within each state, first to facilitate our location and personal inspection of individual tracts, on which the year and volume of the cut were known to them, and which we ourselves then classified as to grade of practice. . . . In the second place, and in order to avoid a biased sample by seeing too great a proportion of the better cuttings, we secured from cooperators . . . their own estimates of the percentage of total cut for each grade for the period covered and compared these data with our field sample."

Statisticians may question the validity of comparing two surveys whose bases differ — the authors' cutting - performance - distribution percentages being based on volume cut, and that of the Forest Service on area operated.

Foresters will wonder why the Research Center failed to employ the same base employed by the Forest Service. Any reader of the report should not lose sight of this difference in base. Despite this difference, the two surveys still yield valuable comparison insofar as gross results are concerned.

Comparison of the Research Center and Forest Service appraisal data for New England bring to light some significant trends. The sample data indicate that improvements in forestry practices have occurred in the region over the 5-year period. This is indicated by an increase from 7 to 15 percent of private practice falling in the two highest cutting-grade groups ("high order" and "good" cutting practices). Percent of "fair" remains about the same, while "poor" has decreased.

Estimates of local foresters, however, shed a different light on the situation. These quantitatively bear out the sample in "good" practices, but they also indicate an increase in "poor" and "destructive" cutting which partially cancels the increase in better practices. The destructive effect results from improved markets for small-size timber and for species not formerly considered merchantable. As a result, possible level of production is definitely lowered by these practices since they still exceed greatly the area and percentage of cuttings that tend to increase productiveness.

The authors believe that education and example on the part of public and private agencies alike have been potent factors in achieving the improvement.

All of this is satisfying to a degree. But is progress rapid enough and in practices at a sufficiently high level to maintain or improve forest productivity? On this point the authors have the following to say: ". . . while cutting practices leading to deterioration or destruction of the forest have not diminished, yet on the other hand there has been a definite improvement and increase in the kind and amount of cutting by private owners that is voluntarily and intentionally directed towards perpetuating and improving the forests on these lands. Since, however, these measures for the most part tend merely to maintain but not greatly improve the condition of these woodlands, it is evident that the effect of the one-third proportion of bad cutting practices must inevitably steadily diminish the future productiveness of the forest resources of these states.

"This fact is independent and supplementary to any calculation as to whether the present drain and loss of existing forest capital already established is greater or less than the annual growth. Its ultimate effect is to decrease this growth and finally to diminish the available volume for consumption."

The Northeast Pulpwood Research Center is to be congratulated on turning out an extremely worthwhile publication. The forestry

recommendations and suggestions set forth should be read carefully not only by forest managers but by all concerned with forest problems and policies.

Without devaluating the overall importance of assuring regeneration, one wishes more attention had been given to techniques designed to increase the yields of forest lands. An arguable point is the authors' statement that ". . . the problem of controlling floods, as far as catchment basins is concerned requires no further thought or effort in this region except for the temporary condition of agricultural abandonment. . ."

Nevertheless, the authors have succeeded in marshalling a wealth of valuable data. It is a veritable encyclopedia of information not only of historical, but of economic and silvicultural, significance. It will undoubtedly find wide use among farmers and timberland owners intent on managing their lands as a business enterprise. Although, in essence, it is a textbook setting forth the latest information on management techniques for the principal forest types of the Northeast, it clearly sets forth the conflicts which influence, for better or for worse, forest practices in the Northeast.

MARINUS WESTVELD,
Northeastern Forest Experiment Station.

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National Lumber Manufacturers Association Golden Anniversary Meeting.

National Lumber Manufacturers Association, Washington, D. C. 211 pp. Illus. 1952. (No price.)

Held last May 8 and 9 in St. Louis, the 50th anniversary meeting of the National Lumber Manufacturers Association brought together lumbermen from all the timber-producing regions of the United States. For the foresters who were there as delegates and guests, the meeting was interesting and instructive because of the attention given to industry progress in forestry, logging, and wood-use research.

Included in this official report of the proceedings are 36 papers presented at the meeting. In general, they constitute an encouraging summation of the industry's progress and goals in improved management and utilization of the timber resource.

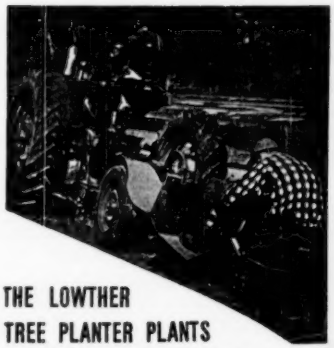
With his customary optimism coupled with his well-known analytical viewpoint, Col. Greeley takes "A Look Ahead" as follows:

"We constantly experience situations where public understanding of what industry is doing and public good-will toward our efforts become a great asset. To a veteran who has witnessed the changes in American opinion toward lumbermen for nearly fifty years, this is one of the most striking portents in the skies. Favorable public opinion is our bulwark against socialistic controls of forest land.

"We can, of course, foresee plenty of problems and challenges in the future of forest industry. One of the greatest challenges is the 4¼ million little woodlands in this country, the farm woodlots and other small holdings which make up 76 percent of our privately-owned commercial forests. The 1949 survey of state foresters finds on these little forests less than one-half the extent of forest management now practiced on the industrial properties. If we ever have federal regulation of forest cutting in the United States, it will come because of the unproductive conditions of the woodlots."

This reviewer, who attended the meeting, left it with a feeling that the industry, which has come a long way in its attitude toward forestry, is irrevocably committed to a policy of improved timber management. The Society of American Foresters and the National Lumber Manufacturers Association have both observed their 50th anniversaries. During the next half-century of "second growth" they will have closer and friendlier associations than ever. That will be good for the forestry profession and good for the industry.

HENRY CLEPPER.



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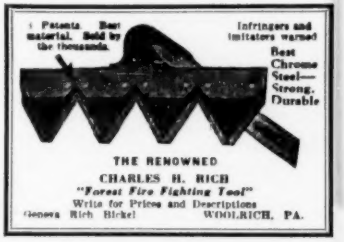

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Society Affairs

Officers and Members of the Council, 1952-1953

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Simpson Logging Company
Shelton, Wash.

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Dead River Company
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University of Minnesota
St. Paul 1, Minn.

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Southeastern Forest Experiment Station, Federal Building
Asheville, N. C.

C. OTTO LINDH
U. S. Forest Service
P. O. Box 1310
Albuquerque, N. M.

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College of Forestry
University of Washington
Seattle 5, Wash.

RICHARD E. MCARDLE
Forest Service
U. S. Department of Agriculture
Washington 25, D. C.

HENRY CLEPPER, *Executive Secretary*
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Washington 6, D. C.

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Southern Kraft Division
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12 Elkin Court
San Rafael, Calif.

RUTHFORD H. WESTVELD
Department of Forestry
University of Missouri
Columbia, Mo.

Upper Mississippi Valley Section Proposes Legislation for Minnesota

An outline of forestry legislation recommended for the state of Minnesota by the Upper Mississippi Valley Section has recently been published in pamphlet form. Copies of the pamphlet, titled *A Forestry Program for Minnesota: Legislative Suggestions for 1953*, may be obtained from the section chairman, Prof. A. E. Schneider, School of Forestry, University Farm, St. Paul.

The program, calling for an increase of approximately $600,000 in state expenditures, is a revision of 1950 proposals which pointed out some of the most urgent forestry problems of the state and suggested legislation and other measures aimed at forest resource development. The pamphlet reports progress made toward putting these earlier recommendations into effect, in addition to bringing the program up to date.

Proposals included in the program call for increased fire protection funds, conservation instruction in all primary and secondary schools and in teacher training programs, increased funds for research, nursery production, access roads, planting on state lands, insect-disease control, and for forest management assistance to counties.

Cost of the program is estimated at $640,000, of which $100,000 to $150,000 is expected to come from state timber sales income if recommendations on enabling legislation should be adopted.

Southern Californians Hold Dinner Meeting

The Southern California Section of the Society held its first meeting of the season in Santa Barbara on October 17, in conjunction with the California Conservation Council's Conference on Forests, Parks, Beaches, and Recreation Use. Conservation leaders from all parts of the state participated in the conference, which lasted from October 16 to October 18.

Eighty-seven members and their guests at the dinner meeting heard Dr. William S. Rosecrans, chairman of the State Board of Forestry, outline recent developments in California's forest management and range improvement programs. Dr. Rosecrans, the evening's principal speaker, discussed present operation of the program through the State Division of Forestry and its future development and expansion in the fields of farm forestry, tree farms, range improvement, and research.

Mexico Establishes Institute of Renewable Natural Resources

Outgrowth of the combined efforts of Mexican and American conservationists, the recent incorporation of the Instituto Mexicano De Recursos Naturales Renovables (Mexican Institute of Renewable Natural Resources) marks a definite forward step in international forestry cooperation. Of special interest to the Society of American Foresters is the fact that two of our Honorary Members were largely instrumental in making the Institute a reality—Randolph G. Pack, president of the Pack Forestry Foundation, and Professor Enrique Beltran, permanent secretary of the Mexican Society of Natural History.

The Institute will serve as a coordinating agency for all resource activities in Mexico, and its function will include the study of conservation problems and the direction of campaigns of information and education for rational resource management. One of the early undertakings of the proposed Institute will be to make an inventory of the renewable resources of Mexico, investigate their condition, and study the principal factors that threaten their reduction or destruc-

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tion, as well as the most favorable techniques for securing maximum yields.

Mexican conservationists, as well as officials of the Pack Foundation have pointed out that although interesting isolated efforts have been made, until now there has been no coordinated policy with regard to Mexico's resources, nor any complete and accurate inventory of them, nor any study of the adverse and favorable factors influencing their conservation, utilization, and development. Today many Mexican governmental agencies are working on conservation problems, but none is so constituted as to be able to devote itself exclusively to coordinated study of these problems.

The interest of the Pack Foundation in Mexican conservation is long standing, and springs in part from the fact that Mexico is a striking example of the crucial relationship between increasing populations and diminishing life-supporting resources. Almost twenty-five years ago the Foundation made a preliminary survey of the Mexican forests. Since then Mr. Randolph Pack, president of the Foundation, has spent much time in Mexico conferring with officials, educators, and conservationists concerning steps that might be taken to establish a definite conservation policy that would put an end to the resource destruction which is resulting in the impoverishment of Mexico's already insufficient agricultural land.

Later activities of the Pack Foundation resulted in a study of the entire resource situation, which culminated in a publication entitled *Land Hunger In Mexico*, later translated into Spanish under the title of *La Crisis De La Tierra En Mexico*.

Early in 1952 as the result of its continued interest the Pack Foundation pledged an initial sum of $100,000 for the creation of the Institute, provided an equal amount could be raised in Mexico. Incorporation papers were signed on August 29 in Mexico City, and Professor Enrique Beltran was appointed director.

It was felt that best results would be obtained by seeking a Mexican organization, composed of Mexicans, and it was also believed that support by private funds from non-governmental sources would have obvious advantages.

Furthering international relations through cooperative projects in forestry has been an integral part of the general Pack Foundation policy ever since its participation in the creation of the United Nations Food and Agriculture Organization. It is felt that forestry and all other fields of conservation can serve as a particularly useful approach for internationally shared activities, and that its ramifications may extend far beyond conservation itself.

The work of the Mexican Institute will in no sense be competitive with the work being carried on either by Mexican Government agencies or by the United Nations and the U.S.A. through Point IV and other assistance programs. On the contrary, the Institute can accept support and financial aid from any of these agencies, and the hope has been expressed that the Institute may serve, through its functions of correlation and integration, and especially through its educational activities, to further efforts in conservation already under way.

H. Stoeckeler Replaces Olson as Committee Head

J. H. Stoeckeler of the Lake States Forest Experiment Station at Rhinelander, Wis., has been named chairman of the Society's collating committee on grade standards for forest planting stock.

Mr. Stoeckeler replaces D. S. Olson who asked to be relieved from the assignment because of the increased demands of the research work which he is carrying on at the University of Idaho.

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Candidates for Membership

Candidates for admission, advancement, or reinstatement whose membership applications were received in the Society office during the month of October are listed below.

Action regarding the eligibility of these candidates will be taken by the Council as of January 1, 1953. Any communications from voting members relating to the membership eligibility of any of these candidates should be received in the Society office prior to that date.

Allegheny Section

Student Grade

PENNSYLVANIA STATE COLLEGE

Arnold, J. W.
Biser, D. B.
Cobi, R. A.
Umholtz, F. A.

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Junior Grade

Carson, T. R., 309 Greeves St., Kane, Pa.; State Univ. of N. Y., B.S.F., 1952.

Member Grade

Geiger, H. W., Forester, The Glatfelter Pulpwood Co., Spring Grove, Pa.; Pa. State, B.S.F., 1944. (Junior, 44R51).

Heagy, J. F., Mgr., The Coleman Sawmill, Worcester, Pa.; Pa. State, B.S.F., 1941. (Junior, 1946).

Appalachian Section

Student Grade

DUKE UNIVERSITY

Martin, C. E.

Junior Grade

Bree, J. C., Forester, Int. Paper Co., Georgetown, S. C.; State College of Tropical Agric., The Netherlands, B.S.A., 1944; Duke Univ., M.F., 1951.

Campbell, P. O., Field Asst., Int. Paper Co., Georgetown, S. C.; N. C. State, B. S.F., 1949.

Member Grade

Ahearn, W. T., Inf. and Ed. Asst., S. C. State Comm. of Forestry, Columbia, S. C.; State Univ. of N. Y., B.S.F., 1943. (Junior, 1946).

Earle, J. D., Asst. to Resident Forester, W. Va. Pulp and Paper Co., Manteo, N. C.; W. Va. Univ., B.S.F., 1940. (Junior, 1946).

Halupka, C. A., Forester, Container Can Co., Hopewell, Va.; Pa. State, B.S.F., 1936. (Junior, 1946).

Harris, T. G., Chief Forester, Halifax Paper Co., Inc., Roanoke Rapids, N. C.; N. C. State, B.S.F., 1941. (Junior, 1946).

Mack, F. N., Cons. Forester, Box 149, Fort Mill, S. C.; Univ. of Ga., B.S.F., 1942. (Junior, 1947).

Nettles, O. W., Supv., W. Va. Pulp and Paper Co., Charleston, S. C.; State Univ. of N. Y., B.S.F., 1935. (Junior, 1946).

Central Rocky Mountain Section

Student Grade

COLORADO A & M COLLEGE

Bossi, J. E.
Doty, W. M., Jr.
Garrison, V. L.
Phillips, D. C.
Thorne, J. W.
Yurick, S.

Member Grade

Swenson, W. S., Forestry Spec., S.C.S., Durango, Colo., Reinstatement.

Central States Section

Student Grade

MICHIGAN STATE COLLEGE

Babbitt, W. E.
Dyment, R. R.
Mack, J.
Rappel, D. C.
Siegel, W. C.
Williams, J. G.

UNIVERSITY OF MICHIGAN

Curry, J. C.
Easterbrook, A. L.
Eber, M. L.
Galusha, H. H.
Harpfer, H. E.
Hogulun, N. O.
Kettenbeil, D. H.
Morgan, J. M.
Peterson, R. W.
Quaile, G. E.
Smock, S. N.
Tom, L. C.
Wagner, A. B.
Yates, D. A.

PURDUE UNIVERSITY

Oliphant, L. M.

Junior Grade

Bender, W. L., 847 Wenonah Ave., Oak Park, Ill.; Univ. of Mich., B.S.F., 1949; M.F., 1950.

Member Grade

Banner, G., Doctoral Candidate, School of Natural Resources, Univ. of Mich., Ann Arbor, Mich.; Univ. of Mich., B.S.F., 1942; M.S., 1951. (Junior, 1946).

Rock, D. C., Cons. Forester, New Paris, Ind.; Univ. of Mich., B.S.F., 1940. (Junior, 1946).

Rudolph, V. J., Asst. Prof. of Forestry, Mich. State College, East Lansing, Mich.; Utah State, B.S.F., 1941; Duke, M.F., 1943; D.F., 1950. (Junior, 1946)

Columbia River Section

Student Grade

OREGON STATE COLLEGE

Enberg, P. R.
Grove, J. D.
Heigh, W. D.
Kahre, R. H.
Kerr, R. I.
Miller, R. B.
Penny, W. F.
Resler, R. A.
Stiles, W. C.
Young, T. S.

Junior Grade

Bohlin, E. W., Park Rgr., Hawaii Nat'l. Park, Hawaii, T. H.; Univ. of Wash., B.S.F., 1949.

Burwell, R. W., Tree Farm Mgmt. Service, Eugene, Oreg.; Univ. of Wash., B.S.F., 1949.

Olson, D. D., Forestry Aid, U.S.D.I., Roseburg, Oreg.; Univ. of Mich., B.S.F., 1950.

Petrie, R., Log Scaler, Columbia River Log Scaling and Grading Bur., Portland, Oreg.; Oregon State, B.S.F., 1950.

Member Grade

Glidden, C. S., Thr. Mgr., Klamath Lbr. and Box Co., Klamath Falls, Oreg.; Univ. of Calif., B.S.F., 1941. (Junior, 1946).

Kuhns, J. C., Retired Asst. Regional Forester, 230 S. W. Glenmorrie Drive, Oswego, Oreg.; Reinstatement.

Phillips, J. M., Forester, Snellstrom Lbr. Co., Eugene, Oreg.; Univ. of Calif., B.S.F., 1946. (Junior, 1946).

New England Section

Student Grade

UNIVERSITY OF MAINE

Broshkevitch, J. B.
Cameron, W. S.
McGowen, N. W.
Simm, B. K.
Smith, R. S.
Vanidestine, W. F.

YALE UNIVERSITY

Craig, J. N.
Norton, T. W.
Westing, A. H.

Member Grade

Husch, B., Assoc. Prof. of Forestry, Univ. of N. H., Durham, N. H.; State Univ. of N. Y., B.S.F., 1943; M.F., 1947; Univ. of Mich., Ph.D., 1952. (Junior, 1946).

Sinay, R. H., Forest Tech., Conn. State Park and Forest Comm., Hartford, Conn., Pa. State B.S.F., 1946. (Junior, 1946).

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Tolle, S. W., Pres., Northeast Wood Products, Inc., Pownal, Vt.; Univ. of Conn., B.S.F., 1937; Yale, M.F., 1942. Reinstatement.

Affiliate Grade

Hambrook, F. G., Cons. Forester, Center Harbor, N. H.; Univ. of N. H., B.S. (Forestry), 1952.

New York Section

Student Grade

STATE UNIVERSITY OF NEW YORK

Ashley, A. N.	Heintz, W. K.
Craine, J. R.	Kirby, S. P.
Cronk, A. G.	Mook, D. G.
Fessel, W. C.	Stevens, P. A.
Frevert, R. W.	Trainer, F. M.
Galvin, B. J.	Wingle, H.P.

Member Grade

Smith, M. P., Forester, N. Y. State Cons. Dept., Lake George, N. Y.; State Univ. of N. Y., B.S.F., 1938. (Junior, 1947).

Associate Grade

Foss, E. W., Agri. Eng. Dept., Cornell Univ., Ithaca, N. Y.; Univ. of N. H., B.S., (Agric.), 1936; Cornell, M.S.A., 1947.

Northern California Section

Junior Grade

Brown, V. A., Photogrammetric Engr., U. S. Geological Survey, Sacramento, Calif.; Univ. of Calif., B.S.F., 1947.

Northern Rocky Mountain Section

Student Grade

MONTANA STATE UNIVERSITY

Hershberger, R. E.

Junior Grade

Asher, L. O., Park Rgr., Nat'l. Park Service, West Glacier, Mont.; Mont. State, B.S.F., 1948; M.F., 1951.

Member Grade

Walbridge, T. A., Jr., Asst. Prof., Mont. State Univ., Missoula, Mont.; Univ. of Wash., B.S.F., 1942; Mont. State, M.F., 1948. (Junior, 1947).

Ozark Section

Student Grade

UNIVERSITY OF MISSOURI

Biswell, C. R.	Ross, K. C.
Carnell, B. M.	Ross, R. D.
Cowley, A. P.	Ryker, R. A.
Gass, R. D.	Scharpf, R. F.
Hepting, W. C.	Shearer, W. D.
McDonald, N. A.	Statler, L. D.
Obernay, E. G.	Woodland, R. W.

Affiliate Grade

Cox, R. G., Jr. Forester, U.S.F.S., Hector, Ark.; Univ. of N. H., B.S. (Forestry), 1950.

Puget Sound Section

Student Grade

UNIVERSITY OF WASHINGTON

Barendregt, P. A.	Moore, R. N.
Harrison, R. P.	Schaefer, D. J.
Karlsson, E.	Schuler, D. E.
Maxwell, W. G.	Traux, W. F.
McIntosh, G. W.	Victor, A. B.

Junior Grade

Martin, R. A., Logging Eng., Ladd Logging Co., Morton, Wash.; Univ. of Wash., B.S.F., 1950.

McCowan, V. F., Forest Ent., Weyerhaeuser Tbr. Co., Tacoma, Wash.; Univ. of Me., B.S.F., 1951; M.S.F., 1952.

Member Grade

Johnston, J. P., Mgr., Forest Div., SHADA, Port-au-Prince, Haiti; Univ. of Wash., B.S.F., 1942; M.F., 1947. (Junior, 1942).

Rucker, J. G., Forester, Simpson Logging Co., Shelton, Wash. (Junior, 1946).

Affiliate Grade

Mackay, J. B., Land Exam., Weyerhaeuser Tbr. Co., Chehalis, Wash.

Southeastern Section

Member Grade

Livingston, K. W., Asst. Forester, A.P.I., Auburn, Ala.; Univ. of S. C., B.S.A., 1940; Duke, M.F., 1948. (Junior, 1949).
Schory, E. A., Asst. Dist. Forester, Fla. Forest Service, Lakeland, Fla.; Mich. State, B.S.F., 1933. (Junior, 35R52).

Upper Mississippi Valley Section

Student Grade

Arrasmith, P. W.	Lassen, L. E.
Dale, M. E.	Popp, R. D.
Haaland, C. J.	Russell, R. J.
Hemphill, M. W.	Schallau, C. H.
Kale, S. W.	Shaw, A. F.

Member Grade

Latimer, M. J., Aux. Forest Supv., Div. of Forestry, State of Minn., Grand Rapids, Minn.; Univ. of Minn., B.S.F., 1941. (Junior, 1946).
Rudolf, P. O., Forester, Lake States Forest Exp. Sta., St. Paul, Minn.; Univ. of Minn., B.S.F., 1929. Cornell Univ., M.F., 1929. Reinstatement.

Wisconsin-Upper Michigan Section

Junior Grade

Becker, R. J., Forester, Wis. Cons. Dept., Madison, Wis.; Univ. of Mich., B.S.F., 1952.

Affiliate Grade

Calabro, J. C., Rgr., Dept. of Cons., Bessemer, Mich.; Mich. College of Mining and Tech., B.S., (Forestry), 1951.
Harju, R. E., Park Rgr., State of Mich. Parks and Recreation Div., Ontonagon, Mich.; Mich. College of Mining and Tech., B.S. (Forestry), 1950.
Kotila, P. E., Forester, Nat'l. Container Tbr. Corp., Tomahawk, Wis.; Mich. College of Mining and Tech., B.S., (Forestry), 1950.
Norkoli, R. R., Asst. Dist. Forester, State of Mich. Cons. Dept., Escanaba, Mich.; Mich. College of Mining and Tech., B.S., (Forestry), 1950.

Foreign

Honorary Grade

Blanford, H. R., Editor-Secretary 1938-1952 (ret.), Empire Forestry Assoc., London, England, Royal Engineering College, Coopers Hill, forestry degree, 1905. Nominated by Committee on International Relations (Tom Gill, chairman). Endorsed by J. D. B. Harrison, Barrington Moore, J. W. B. Sisam.

Arkansas A. & M. Graduates Eligible for Affiliate Membership

The Department of Forestry of the Arkansas Agricultural and Mechanical College, College Heights, Ark., has met the requirements which qualify its graduates for Affiliate Membership (Class A).

Graduates of nonaccredited forestry schools may apply for the Affiliate grade (Class A) if they have completed all of the required basic forestry courses which must be included for a forestry curriculum to be approved. A list of qualifying forestry schools appeared in the September JOURNAL OF FORESTRY.

From the time he leaves his home, General Logging Superintendent Tony Zoffel is in touch with the job via the G-E 2-way radio.

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GENERAL ELECTRIC

Forestry News

W. M. Foss Appointed to Top N. Y. Conservation Post

William M. Foss, assistant director of the New York Conservation Department's Division of Lands and Forests since 1949 succeeded Arthur S. Hopkins as the Division's director on October 1 when the latter's resignation became effective.

The Division's widespread activities include administration of the state's vast forest preserve holdings in addition to the work of such units as Forest Fire Control, Camps and Trails, Forest Pest Control, Forest Tree Nurseries, Forest Management, State Forests (known formerly as Reforestation Areas) and Land Acquisition.

Employed by the Conservation Department as a Forester in 1924, Mr. Foss was promoted in 1932 to supervising forester in charge of the New York Civilian Conservation Corps program sponsored by the Division of Lands and Forests. When this program ended in 1942, he was appointed superintendent of Forest Pest Control, heading that bureau until his promotion to assistant director of the Division.

WILLIAM M. FOSS

He is a graduate of the University of Maine with a B.S. degree in Forestry.

H. H. Chapman Guest Professor At Minnesota Forestry School

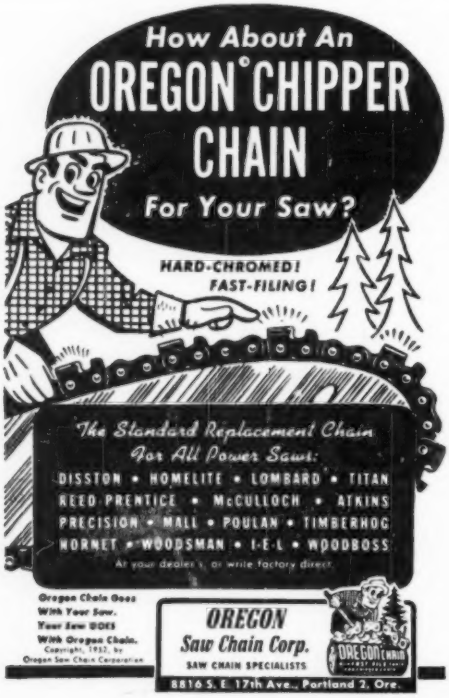
H. H. Chapman, Professor Emeritus, Yale School of Forestry, has been appointed to the Minnesota School of Forestry staff for the fall quarter as a guest professor.

Prof. Chapman began his career in Minnesota and received his Bachelor of Science and Bachelor of Agriculture degrees from that institution in 1898. He obtained his forestry training at the Yale School of Forestry, joining the staff of that institution shortly after receiving his degree. In 1943, he retired to the status of Professor Emeritus.

During his stay in Minnesota Prof. Chapman plans to visit the Chapman Plantations at Grand Rapids, which he established in 1900. These are generally considered the oldest successful forestry plantings in Minnesota.

U. of N. H. Offers 5-Day Course in Use of Aerial Photographs

The Forestry Department of the University of New Hampshire announces a short course in the use of aerial photographs, designed principally to en-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able men engaged in forestry and other land management activities to make full use of aerial photographs. The course will last five days, January 19 to January 23, 1953. A large part of the time will be spent in the laboratory actually working with aerial photographs.

Topics to be covered are: procurement of aerial photographs; aerial photographic specification; fundamental mathematics of an aerial photograph; use of the stereoscope; photographic interpretation; measurement of height from photographs; mapping from aerial photographs; measurement of area; and timber volume estimation from photographs.

Further information and application blanks may be obtained from B. Husch, Department of Forestry, University of New Hampshire, Durham, N. H.

Ellwood Wilson (1872-1952)

Ellwood Wilson, one of Canada's outstanding consulting forestry engineers, died at Montreal, Quebec, on May 24, following a surgical operation. He was 80 years of age.

Born in Philadelphia, Pa., February 16, 1872, he attended the University of the South at Sewanee, Tenn., receiving the A.B. and S.B. degrees in 1893. Mr. Wilson subsequently studied civil engineering at the University of Pennsylvania, and took postgraduate courses at the Fresenius Laboratory in Germany and the Jenner Institute in London.

During the period 1897-1901, he was manager of the Walker-Gordon Laboratories in London, and practiced as a consulting forestry engineer from 1901 to 1907. In 1907 he became chief forester of the Laurentide Company, Ltd. in Quebec, a position he held for 25 years.

During World War I, he rendered notable service with the Imperial Munitions Board.

Until 1929, Mr. Wilson was president of Fairchild Aviation, Ltd., which he had organized in 1919. He started the use of aerial photographs in forestry and other mapping operations in Canada.

In 1932, he became acting professor of silviculture at Cornell University, where he served until 1934. Since that date he had been active in private forestry practice.

Past president and director of the Canadian Forestry Association, he was co-founder of the Canadian Society of Forest Engineers, and founder and past chairman of the Woodlands Section, Canadian Pulp and Paper Association. Mr. Wilson held many other important forestry and civic posts in Canada. He became a naturalized Canadian citizen in 1927.

Elected a Fellow, in 1949, of the Society of American Foresters, he had been a Member since 1915. He was also a Fellow of the American Association for the Advancement of Science and of the Foresters of Great Britain. Mr. Wilson was a past director of the American Forestry Association and of the Charles Lathrop Pack Forest Education Board.

Mosebrook Joins C. of C. As Forest Resources Assistant

The Chamber of Commerce of the United States has announced appointment of Harry S. Mosebrook as forest resources assistant in its Natural Resources Department.

HARRY S. MOSEBROOK

Mosebrook was Forester for the Monongahela Power Company, Fairmont, W. Va., from April 1947 to January 1951. He took part in a program of territorial development covering all phases of resource development and use, and working with youth organizations, state and federal agencies, industrial groups, and all types of citizens' organizations.

From January 1951 to September 1952, he served with the 78th AAA Gun Battalion, with rank of Captain. His primary duties were military intelligence in Korea.

Mosebrook is a native of St. Paul, who received his B.S. (Forestry) degree in 1937 from the University of Minnesota, and his M.F. degree from the University of Michigan in 1941.

Research Forester Transferred

Richard C. Wilson, a member of the staff of the Pacific Northwest Forest and Range Experiment Station at Portland, has been transferred to the Washington, D. C. office of the U. S. Forest Service.

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Southwide Forest Genetics Meeting Planned

An open meeting on the improvement of southern forest trees through the application of genetics will be held in the Peachtree-Seventh Building in Atlanta on January 6 and 7, according to an announcement by the Committee on Southern Forest Tree Improvement. The meeting will feature reports of progress by various private, state, and federal foresters who are engaged in developing superior trees for southern industry. Several authorities from other regions will also talk on developments in this country and in Europe.

The committee which represents various state, federal, industrial, and educational forestry groups, was formed in January 1951 to stimulate and assist in coordinating forest genetics activities in the South particularly as applied to the present planting program of about a quarter of a billion seedlings a year. It is sponsoring a major cooperative study of the effect of seed origin on the plantation performance of the four major southern pine species. Several subcommittees have prepared and published summary publications to assist individual research workers and practitioners.

Dr. C. M. Kaufman, Director of the School of Forestry at the University of Florida, Gainesville, is chairman of the arrangements committee for the general meeting. Other members are P. T. Lannan, Jr., West Virginia Pulp and Paper Company, Bruce Zobel, Texas Forest Service, and Keith Dorman and C. A. Connaughton, U. S. Forest Service.

The meeting is open to all those interested in the possibilities of genetics in Southern forestry. Those planning to attend should notify Dr. Kaufman in Gainesville, and should make their own arrangements about hotel accommodations in Atlanta. The meeting will start at 9:00 a.m. on January 6 in room 422 of the Peachtree-Seventh Building at 50 Seventh Street, NE. The program ends at 12:30 p.m. on January 7.

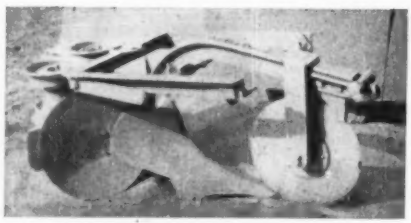
SMOKEY, the Bear, has inspired a story in *Newsweek*, led Hollywood songwriters to compose the song, *Smokey, the Bear*, caused two campers who happened on a Smokey poster to backtrack several miles to check their campfire—which wasn't out—and is generally making millions of Americans daily more fire conscious—and more appreciative of forests.

W. R. Chapline Joins F.A.O.

W. Ridgely Chapline, former chief of the Forest Service's Division of Range Research who retired in October after forty years, left for Rome on November 1 to work with the Food and Agriculture Organization of the United Nations as a range consultant in the F.A.O.'s forestry division. In his new position Mr. Chapline will deal with world-wide activities in conservation, improvement, and management of range lands.

Mr. Chapline has a broad understanding of range conditions in this country and abroad and is recognized as an international authority on range land problems. In charge of range research for the Forest Service since 1920, he has had first-hand contact with range activities in all parts of this country and has written nearly 70 departmental publications, as well as technical and practical articles on such activities.

Born in Lincoln, Neb., in 1891, Mr. Chapline received his B.S. degree in forestry from the University of Nebraska in 1913. He is a member of the Society of American Foresters, and a number of other national organizations.



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A FORMER LUMBERJACK, George H. Wilson, 27, was recently presented with the U. M. Dickey award established last year by the Scott Paper Company, which provides $1,000 per year for two years to an outstanding junior in the University of Washington's College of Forestry. Wilson, shown above *center* with Gordon D. Marckworth, dean of the college *left*, and Dr. Henry Schmitz, president of the university, is the first student to receive the Dickey award which will be offered annually for five consecutive years. He was chosen on the basis of academic standing, character, and leadership. A Marine veteran of Guadalcanal and Tarawa, Wilson entered the University of Washington in 1950 after three years as a lumberjack. "I was doing all right working in the woods, but I decided I'd better get an education," he said. "So I quit my steady job, put my wife to work and went back to school."

Court Upholds Superior Air Ban

A court decision upholding the President's order banning use of airplanes over the Superior roadless areas was issued by Judge Gunnar H. Nordbye in the United States District Court at Duluth September 26.

The decision was made in two cases, consolidated for the purpose of trial, brought by the United States of America against violators of the air ban.

In a 16-page decision, the court reviewed the establishment of the roadless areas in 1927 and regulations promulgated to preserve their unique character. Excerpts from the court's findings of fact lead off with the following statement:

"The policy of the Government in preserving this region in its primitive state has been manifested by the various acts of Congress, committee reports, and the various regulations of the Secretary of Agriculture. The conservation of this wilderness tract is an outgrowth of years of government planning."

DURING October Maine became the latest state to participate in the American tree farm system. A series of three separate dedication ceremonies added 9,146 acres to the classified area.

As of the first of November the national total of tree farms passed the 27-million-acre mark.

Hyde Heads N. Y. Fire Control

Solon J. Hyde of North Chatham, New York has been appointed to the position of superintendent of the Bureau of Forest Fire Control in the New York Conservation Department. Mr. Hyde takes over the position left vacant by Kinne F. Williams, recently appointed as assistant director of the Division of Lands and Forests.

Mr. Hyde has been Supervising District Forest Ranger for 13 years, with headquarters in the Conservation Department's Albany office. In this capacity, he has been acting as immediate supervisor of the department's forest fire control forces. He is a graduate of the New York State College of Forestry, 1919.

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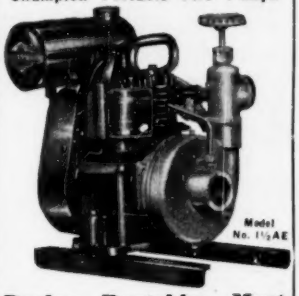

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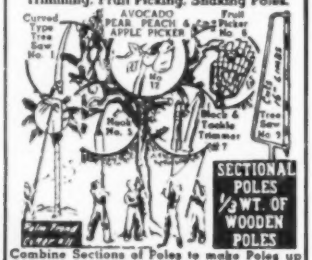
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Range Management Degree Offered at California

The University of California announces final approval of a curriculum in range management. Heretofore, range management courses have been offered in the School of Forestry and the Department of Agronomy.

The new curriculum, which offers a degree in range management, will require that the student spend one of his upper division years on the Davis campus of the University where he will take principally animal husbandry and agronomy courses, and the other on the Berkeley campus where he will take courses in range management and forestry. The first two years of the curriculum offer a broad basic training made up of courses which can be obtained in most colleges, while the second two years are devoted chiefly to professional courses.

The courses required in the range management curriculum with semester units are listed as follows:

Chemistry (General Inorganic; Organic)	8
Zoology (General)	8
Botany (General; Plant Physiology)	9
English and/or Speech (Composition and/or Elements of Speech	6
Geology or Soils (Structural Geology or Elements of Soil Science)	3 or 4
Engineering (Plane Surveying)	3
Physics (Mechanics; Heat; Light; Electricity)	6
Economics (Principles) or Economics (Principles) and Agricultural Economics	6
Animal Husbandry (Judging; Feeds and Feeding; Management; Meat Production)	10
Agronomy (Crop Production; Forage Crops; Range Plants)	9
Forestry (Range Management; Forest Ecology; Range Technics; Range Utilization; Grassland Ecology)	12
Soils (Medium for Plant Growth)	4

In addition, the student must select fifteen units from a list of restricted electives which includes courses in agricultural economics, animal husbandry, botany, forestry, genetics, irrigation, soils, and zoology. The large number of restricted electives will make it possible for the student to select courses along lines of particular interest such as animal husbandry, agronomy, botany, or soils.

A six-weeks summer course in applied range management is required without units of credit. This should be taken at the end of the sophomore year.

The curriculum is administered by a committee composed of representatives of the Departments of Agronomy and Animal Husbandry on the Davis campus, and the School of Forestry on the Berkeley campus.

Wisconsin Town Pioneers Conservation Training Plan

The public schools of Merrill, Wis., are trying out a new approach to the teaching of conservation.

Utilizing the 732-acre Nels P. Evjue Memorial Forest, given to the Merrill school system in 1944 by William P. Evjue, newspaper publisher of Madison, as an "outdoor laboratory," the novel method introduces conservation practices and problems into nearly every subject in the curriculum. Originator of the plan is Russell S. Way, superintendent of schools, who has put it into effect in three pilot groups of sixth graders, ninth grade English and social studies students, and the senior high school agriculture class. Technical guidance is given by Trees for Tomorrow, a conservation and reforestation group sponsored by paper mills and power companies, and the school system's own conservation specialists.

Arithmetic problems in forestry computation and English composition subjects drawn from forestry techniques and resource conservation, both in conjunction with fields trips to the forest, are samples of the working of the method. The teachers of the three control groups will report on ways found to introduce conservation into the curriculum and the report will form the basis of the hoped-for new method of instruction.

Harris A. Reynolds Honored

The Forestry and Woodusing Industries Committee of the New England Council at a recent meeting honored Harris A. Reynolds for his leadership in the field of forest management. Reynolds, secretary of the Massachusetts Forest and Park Association as well as secretary of the New England Forestry Foundation, is a long-time member of the S.A.F.

In presenting the award, a silver bowl, Nathan Tufts, chairman of the committee, said in part: "All his life, Mr. Reynolds has been a leader in conservation, an aggressive and successful organizer, a promoter of important legislation, willing to attack as well as defend; gifted with amiability and humor, and industrious in his daily work."

Planting Guide Published

The Illinois Technical Forestry Association has published a 35-page planting guide, *Forest Planting Practices for Illinois*. The mimeographed publication, which has 12 multilithed illustrations, is designed as a professional guide in reforestation practices of the state. Based on previously published work together with experience and observation within the organization, it covers such subjects as planting stock, planting, spacing, and direct seeding. Species in relation to site is handled through use of six guide charts, while reforestation of strip-mined areas is given special consideration.

Preparation of the booklet was begun in 1951 by a special committee whose membership included E. N. Lee, chairman, W. R. Boggess, G. H. Deitschman, Wilfred James, L. H. Kahler, Paul Lamendola, L. S. Minckler (sub-chairman), W. L. Ashby, J. D. Larson, H. B. Wycoff and R. W. Lorenz (sub-chairman). Although the guide is not available for general distribution, copies have been sent to forest school libraries and forest experiment station libraries.

Awards for Service Given At A.F.A.-N.C.F.A. Meeting

The annual meeting of the American Forestry Association was held jointly with the North Carolina Forestry Association at Asheville, N. C., October 13–15.

"Forests and Water" was the theme of the meeting. Among the speakers were R. E. McArdle, chief of the U. S. Forest Service; I. F. Eldredge, consulting forester of New Orleans; Charles A. Connaughton, regional forester, U. S. Forest Service, Atlanta; and Carlton J. Blades, chief forester of Duke Power Company, Charlotte, N. C.

Plaques for outstanding service to forestry were awarded at the associations dinner to Ovid Butler, former executive director of the association; William S. Rosecrans, chairman of the California State Board of Forestry; Governor Herman E. Talmadge of Georgia; E. L. Kurth, of Lufkin, Tex.; and H. C. Fetterolf of Harrisburg, Pa.

The members had the choice of four field trips to points of interest in the southern Appalachians, including the Coweeta Hydrologic Laboratory; Great Smoky Mountains National Park and the Cherokee Indian Reservation; the Pisgah National Forest, Biltmore Plantations, and the Champion Paper and Fibre Company; and the Blue Ridge Parkway.

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By FREDERICK DEFOREST HEALD. *McGraw-Hill Publications in the Agricultural Sciences.* Second edition. 953 pages, $12.00

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Forest Management Corporation Established in Washington, D. C.

A group of foresters in the Washington, D. C. area have pooled their technical knowledge and funds to establish The Forest Management Corporation, a stock company incorporated and authorized under the laws of Maryland to acquire and develop lands and operating facilities.

Purpose of the group is to demonstrate that good forest management can pay dividends to owners and operators. As an initial step it contemplates the acquisition of cutovers and advanced second growth as well as areas with currently marketable material.

While participation in the corporation is not limited to foresters, the group plans to interest enough foresters as stockholders to assure that forestry concepts will prevail in the management of acquired lands for timber products, wildlife and recreation.

Officers of The Forest Management Corporation are Albert G. Hall, forestry relations counsel, president; Charles M. Genaux, forestry relations counsel, vice-president; Arthur M. Sowder, forester, secretary; Bernard A. Chandler, consulting forester, treasurer; John E. Wiggins, forester, assistant secretary-treasurer. The officers named above, Bennett O. Hughes, forester, and Vance A. Tribbett, forester, make up the board of directors.

W. T. Cox Honored by Minnesota For Conservation Contribution

William T. Cox's nearly fifty years of activity in the forestry and wildlife conservation fields were recognized recently by the state of Minnesota. Gov. Anderson presented Mr. Cox, who organized the state forestry service, with a certificate of meritorious service to state, national, and international conservation progress.

Mr. Cox, a resident of St. Paul, is now a contributing editor of *The Farmer* magazine.

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Utah State College Increases Forestry Staff

A number of staff additions and changes were announced recently by the School of Forest, Range and Wildlife Management of Utah State College.

Ross Tocher has been appointed assistant professor of forest products and utilization, succeeding Calvin M. Bowen who has taken a position with the Bureau of Land Management in the Pacific Northwest. Mr. Tocher received the B.S. and M.S. degrees in products and utilization from the University of California, and has several years experience in the operation of forest products mills in the redwood region. Associate Professor Raymond R. Moore is now teaching full time in the Forest Management Department and was recently appointed director of the summer camp. Professor T. W. Daniel has resumed his duties as professor of silviculture after a year in Austria on a Fulbright fellowship. Other members of the department are Professor J. Whitney Floyd, head, and Lewis M. Turner, who is also dean of the school. Associated and cooperating with the department is Dr. James L. Mielke, Bureau of Plant Industry, research professor in forest pathology.

The Range Management Department, headed by Dr. L. A. Stoddart, now has four staff members. Others are Associate Professor Arthur D. Smith, Associate Professor C. Wayne Cook, and Assistant Professor Grant Harris. The department is initiating a program of range extension work with Professor Harris, Range Management Extension Specialist and Extension Forester in charge. All members of the staff are currently engaged in research in the fields of range improvement, nutritional value of range plants, big game-domestic livestock competition for range forage, halogeton control or related subjects.

The Wildlife Management Department is made up of three full time staff members and three research associates. Dr. William Sigler is head of the Department, assisted by Professor George Hills Kelker and Assistant Professor Alan Stokes, recently appointed. Professor Stokes received the Ph.D. degree in Wildlife Management from the University of Wisconsin. Associated in research are Dr. J. B. Low, leader of the Cooperative Wildlife Research Unit; Dr. Oliver Cope, director of the Rocky Mountain Fisheries Research Unit; and his assistant, Mr. Harvey Moore. The fisheries research unit was recently transferred to Utah State College from Stanford University.

This increase of staff and changes in teaching responsibilities have facilitated and accelerated the school's overall research program. Graduate work in all three departments has been expanded; more graduate students are now registered with the school than any time in its history.

Other developments include the remodeling and renovation of the forestry building; reworking of the curricula in all three departments, including significant changes in summer camp instruction; establishment of an organized plan of combined work-instruction and training experience in the summer for freshmen and juniors; construction of a headquarters lodge at the school forest and further revision of the management plan of the forest; and enlargement of the cooperative Clarke-McNary forest nursery.

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Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

Obviously, the Society cannot assume responsibility beyond making it possible for prospective employee and employer to enter into negotiation.

Positions Available

Forestry graduate to assist in intensive management of small plantation in southeastern United States.
Box L, Journal of Forestry, Mills Building, Washington 6, D. C.

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POSITIONS WANTED

Forester, 37, B.S.F., with family, 6 years with U. S. Forest Service in South, desires position in forest industry. Prefers South. Details and references on request.
Box A, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S.F., New York State College of Forestry. Experienced in pulpwood operations, logging, cruising, land surveying, forest management, and public relations. Age 29, married, one child. Desires new employment for better opportunity with pulp industry or private enterprise in Northeast or Lake States. Now employed as pulpwood buyer and forester. Can offer excellent references.
Box R, Journal of Forestry, Mills Building, Washington 6, D. C.

Wanted, sales connection. Experienced in sales and manufacture, lumber and forest products since 1923, have office training, experienced hardwood grader, generally conversant softwood grades. Married, middle-aged, acquainted with trade in, and prefer, Wisconsin.
Box W, Journal of Forestry, Mills Bldg., Washington 6, D. C.

Forester, 29, B.S.F. (Utilization), L.S.U., 1951; married, two children. Presently flying under government contract in Mississippi desires to relocate in Far West in combination flying-forestry type job. Fully qualified commercial pilot with total of 2,000 hours, all type aircraft. Forestry experience: scaling, cruising, aerial photo, plywood and veneers, preservation.
Box S, Journal of Forestry, Mills Building, Washington 6, D. C.

F. H. Eyre Named to Head Forest Management Research

Francis H. Eyre, formerly of the Lake States Forest Experiment Station at St. Paul, Minn., has been named chief of the Division of Forest Management Research in Washington by the Department of Agriculture. He succeeds Leonard I. Barrett, who has been appointed director of the timber resource review project of the Forest Service.

In his new position Eyre will coordinate research on growing and handling timber on forest lands being carried on at eleven forest experiment stations in the United States, Puerto Rico, and Alaska.

For the past 13 years Eyre has been chief of the Lakes States Station Division of Forest Management Research which carries responsibility for forest research in Minnesota, Wisconsin, Michigan, and North Dakota. He is the author of some 25 scientific articles concerning forestry in the Lake States, and is also chairman of the S.A.F. committee on forest types. In 1951 he received a superior service award from Secretary of Agriculture Charles F. Brannan for "outstanding accomplishment and leadership in research in forest management."

Born in Little Valley, N. Y., Eyre received his professional training at Cornell University, and at the University of Michigan from which he graduated in 1922.

Louisiana Forestry Commission Opposes Increase in Federal Aid

The Louisiana Forestry Commission, in regular quarterly meeting at Alexandria on September 9th, went on record as being opposed to any further increase in federal forestry appropriations. Their statement is as follows:

"We hereby resolve to instruct the State Forester to take every opportunity in his official capacity to discourage any additional federal forestry appropriation to the states, except for financial aid on forestry research and in the control of insects and diseases. The Commission goes on record as being against increasing federal aid for fire control (CM-2), seedling production (CM-4), and management assistance (CMF)."

Forester, member S.A.F. and Association of Consulting Foresters, now employed as president and general manager of consulting and operating firm in Michigan desires responsible temporary employment during sabbatical leave (January-March 1953). Prefer an assignment in South, Southwest, or Foreign. Adequate living quarters for family of five, plus interesting assignment more important than high salary.
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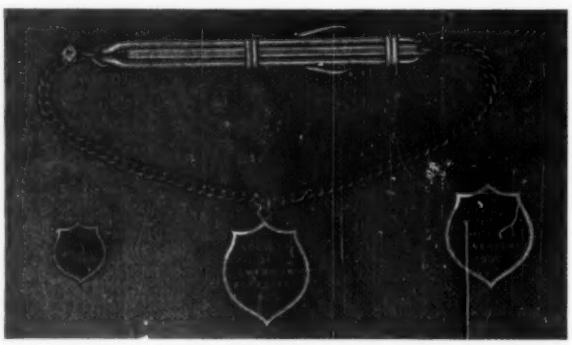

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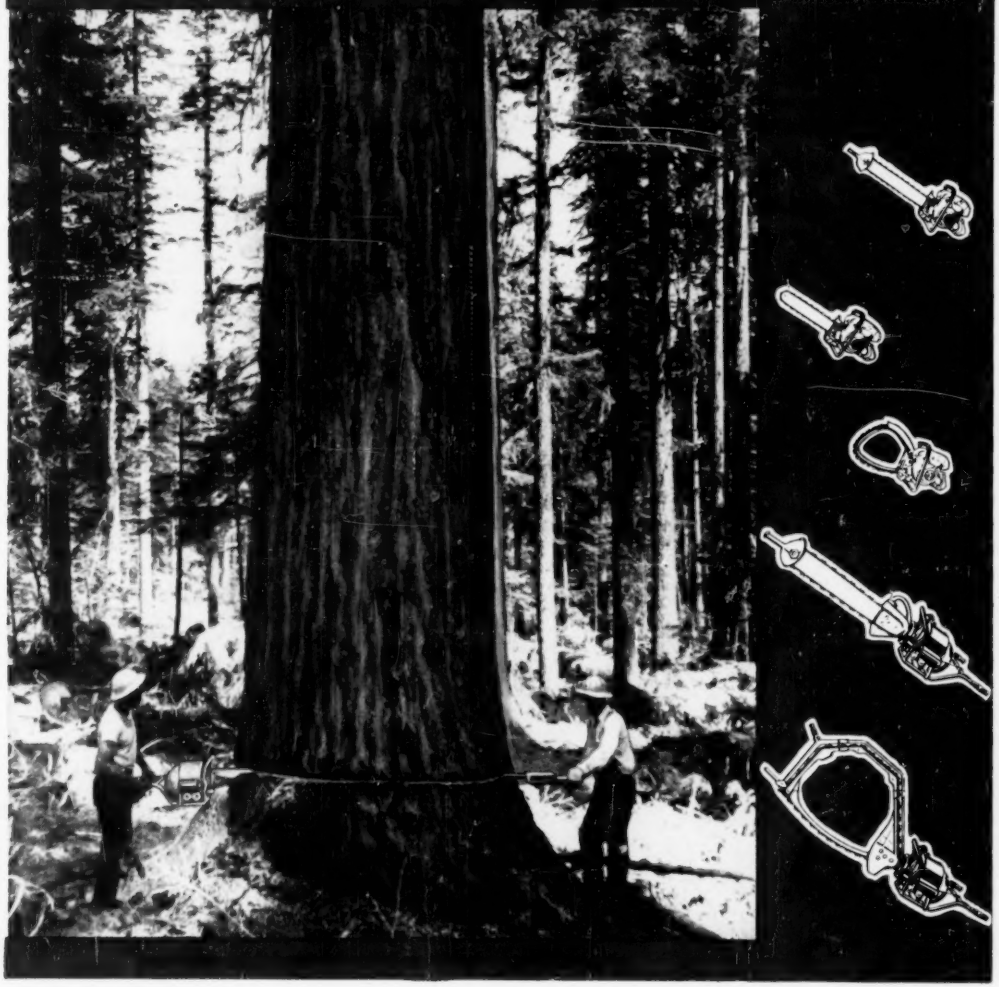

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